International Atomic Energy Agency

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INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

REPORT TO THE DIRECTOR GENERAL
OF THE
FIRST MEETING OF THE
INTERNATIONAL NUCLEAR DATA COMMITTEE
VIENNA 13-17 MAY 1968

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

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Dounreay, February 1969

- CONTENTS -

" ... the INDC will have the dual purpose of serving as a means of promoting international cooperation in all phases of nuclear data activity, and of advising the Director General of the IAEA in this field."

By these words from the Terms of Reference for the International Nuclear Data Committee the Agency acquired a committee which is more than a working group and more than a panel. Its first meeting took place 13-17 May 1968 in Vienna. The reports that were made and the discussions that took place were evidence of high enthusiasm for the committee and the task it was commissioned to do.

Active participation by the IAEA in the area of Nuclear Data (meaning " ... especially nuclear interactions with neutrons which are basic to nuclear energy programs" *) has been and is primarily the responsibility of the Nuclear Data Unit; to it goes most of the advice that the committee addresses to the Director General. In the sense that the INDC is a continuously acting working group, it is complementary to, and interacts with the Nuclear Data Unit, to establish and promote in an effective way the Agency activities in the area of Nuclear Data. It is appropriate therefore in connection with this report to acknowledge explicit contributions that the INDC has made to international collaborations in various areas of Nuclear Data. These contributions can be traced to the continuing character which the committee now has as a "working group". Through explicit actions of the INDC, international collaboration has been profoundly influenced and strongly assisted in the following areas:

(a) compilation and exchange of neutron data;
(b) standards for neutron cross section measurements;
(c) international meetings.

*Footnote: p.11 INDSWG/R&C/2

Committee Membership and Meeting Attendees

The following persons were present:

1. Members

Abramov, A. I. (USSR)
Divatia, A. S. (India)
Hanna, G. C. (Canada)
Joly, R. (France)
Kinchin, G. H. (U.K.)
Kofoed-Hansen, O. (Denmark)
Kolstad, G. A. (U.S.A.)
Momota, T. (Japan)
Schmidt, J. J. (Germany, Fed. Rep.)
Souza-Santos, M. (Brazil)
Symonds, J. L. (Australia)

2. Representatives of International Organisations

Häussermann, W. (ENEA/OECD)
Janeva, N. (JINR, Dubna)
Spaepen, J. (Euratom)

3. Technical Advisers

Bell, V. (ENEA/OECD)
Havens, W. W., Jr. (U.S.A.)
Rae, E. R. (U.K.)
Taschek, R. F. (U.S.A.)

4. Others Participating

Slaus, I. (Yugoslavia)
Niewodniczanski, T. (Poland)
Sujkowski, Z. (Poland)

5. From the IAEA Nuclear Data Unit

Good, W. M. (Scientific Secretary)
Lorenz, A. (Scientific Secretary)
Attree, P.M. (part-time only)
Hjarne, L. } (part-time only)
Konshin, V. }
Lemmel, H. D. }

The Chair was taken by Mr. Kinchin throughout the meeting.

- AGENDA OF THE MEETING -

I. Organisation and Announcements
   (A) Opening and Announcements
   (B) Adoption of Reports of Last Meeting
   (C) Adoption of Agenda

II. Progress Reports
   (A) From each Representative Member
   (B) From the N.D.U. of the IAEA

III. Methods of Work

IV. Sample Problem

V. Meetings
   (A) Washington Conference on Neutron Cross Sections and Technology 1968
   (B) IUPAP Conference on Nuclear Physics
   (C) Second IAEA Conference on Nuclear Data
   (D) Other IAEA Conferences and Meetings
   (E) Other Continuing Agency Groups
   (F) The 1969 Panel for Nuclear Data

VI. Evaluated Data
   (A) Review of Evaluation in Member States
   (B) International Exchange of Evaluated Data
   (C) International Exchange of Data for Safeguards

VII. Topical Discussion
   Ratio of Capture to Fission for ^{239}Pu.

VIII. Compilation
   (A) Report from Brookhaven
   (B) Report from Obninsk
   (C) Report from Saclay
   (D) Report from the N.D.U. of the IAEA

IX. Visit to Seibersdorf

- cont'd.

X. Request List

(A) Review of Present Requests

(B) INDC/IAEA Request List

(1) compilation of requests

(2) publication of request list

XI. Facilities List

(A) Review of Status

(B) Recommendation from EANDC

(C) Consideration of Needs for Facilities List

XII. Report of 2200 m/sec. Fission Constants Re-Evaluation

XIII. Standards

(A) Review of Brussels Panel Report

(B) Review of Recent Measurements

(C) Considerations of possible IAEA activities

- BRIEF SUMMARY OF THE AGENDA -

I. ORGANISATION AND ANNOUNCEMENTS

(A) Opening and Announcements

1. The meeting was opened by Dr. Seligman, Monday 13 May at 10.00 a.m. with remarks that recalled the INDSWG background of the INDC.

2. The Chair was taken by Mr. Kinchin who had been elected at the previous meeting and who, prior to the meeting, had worked with the Scientific Secretary for its preparation.

(B) Adoption of Reports of INDC-1967

3. The formal report INDC/R&C/6 and the informal minutes INDC/IM/6 of the previous meeting were approved and accepted.

(C) Adoption of Agenda

4. The provisional agenda which had been drawn up and submitted to the Committee members prior to the meeting was modified to accommodate certain speakers who had special reports to make.

II. PROGRESS REPORTS

(A) From Each Representative of Member State or International Organisation

5. The Chairman called for a report from each attendee that was present regardless of committee affiliation (e.g. member, observer, etc.). A one line sketch of each report is as follows:

(a) Dr. Spaepen (Euratom) reported specifically on work in progress at the Geel laboratory. Among items stressed in his report were work on standards, threshold detectors, sub-threshold fission.

(b) Dr. Rae (U.K.) reported work in U.K. on sub-threshold fission which is of recent special interest. He also reported on the measurements for α for ^{239}Pu which is of present importance to reactor design. Otherwise his report was very much in the area of "standards". In following discussions it developed that new results on half-lives of ^{241}Pu and ^{233}Pu were such as to make a consultants' meeting worthwhile.

(c) Dr. Symonds (Australia) gave special mention to Mr. Lorenz' visit; he reported on a study of the effects of missing levels on reactor calculation, on studies of $\bar{\nu}$ (E) from thermal to the low MeV range and on radiative neutron capture γ ray spectra studies in progress. He referred to the role of the IAEA in the collaboration between Australia and India.

(d) Mr. Hanna (Canada) reported on measurements of the ^{59}Co, ^{238}U and ^{238}Pu cross sections at 2200 m/sec and on the moderator scattering law whose results were still being worked up.

(e) Dr. Niewodniczanski (Poland) reported excitation function measurements for (n,n') and σ(n,y), on the study of spontaneous fission of ^{252}Cf, and on angular distribution of light particles from fission of ^{252}Cf. He also appealed for help with the problem of securing targets.

(f) Dr. Abramov (USSR) reported precision measurements ($\approx$3%) on the ratios σ_f (^{233}U)/σ_f(^{235}U and σ_f(^{239}Pu)/σ_f(^{235}U) and En from 0.3 to 2.5 MeV. Measurements he said have also been made on the ratios $\bar{\nu}$(^{235}U/ $\bar{\nu}$(^{235}U thermal) and $\bar{\nu}$ (^{232}Th)/ $\bar{\nu}$(^{235}U thermal) for which a fine structure is observed. Delayed neutron yields have been measured in the energy range 18-21 MeV and an energy dependence is observed which needs further investigation. These measurements were performed at Obninsk where two new instruments, the Tandem and the Microton are in operation. He mentioned the capture to fission measurements for ^{235}U and ^{239}Pu below 30 keV that have been made at Dubna which Miss Janeva reported in greater detail at the Topical Discussion. He referred also to measurements taking place at the Physics Institute of the Ukranian S.S.R. at Kiev, and the Khlopin Radievyj Institute in Leningrad.

(g) Dr. Schmidt (Germany) reported measurements at Karlsruhe on neutron radiative capture, high resolution neutron total cross-sections, and fission cross-sections. He also reported that (n,α), (n,p) and (n,2n) measurements were being made at Munich and Hamburg.

(h) Dr. Divatia (India) reported on studies of K (X-ray) yields and long range alphas in fission; he also made special mention of the benefits of Mr. Lorenz' visit.

(i) Dr. Momota (Japan) reported that a computer program had been written for the analysis of resonance data. He emphasised evaluation work now being carried out and mentioned in particular the case of σ_T for C below 2 MeV because it had been especially recommended for evaluation at the Tokyo meeting of INDC.

(j) Dr. Souza-Santos (Brazil) reported a new technique for flux measurement, viz. radiation damage in micro-detectors whose advantage is the small amount of detector material required; he also reviewed Brazil's facilities, stating that the Atomic Energy Institute (IEA) in Sao Paulo is the only institute in the Latin American countries which is engaged in experimental neutron physics.

(k) Dr. Taschek (U.S.A.) reported that new fission cross-section measurements had been made for ^{235}U between 30 keV and 1.5 MeV which are low and that he believes them to be in error; he also reported new "explosion measurements" to measure capture and fission cross-sections of a number of nuclides, including ^{232}, ^{233}, ^{234}, ^{235}, ^{236}, ^{237}U, ^{237}Np, ^{238}, ^{242}Pu, and ^{243}Am. He said that $\bar{\nu}$(0.01 - 40 eV) for ^{235}U had been measured at Rensselaer, and that to an accuracy of 0.25% no energy variation had been observed.

(l) Dr. Havens (U.S.A.) reported radiative capture spectra and fission measurements at Argonne and Brookhaven, neutron scattering in ^{233}, ^{235}U, ^{241}Pu at Lawrence Radiation Laboratory, ν, η, σ(T) at Rensselaer and ORNL, and (n,n'γ) at Texas Nuclear.

(m) Dr. Kolstad (U.S.A.) reported the Brookhaven Tandem (90% complete), the Duke Cyclograph (a new instrument by fall 1969), the Los Alamos Meson Factory (summer 1971), and the Linac at Oak Ridge.

(n) Dr. Kofoed-Hansen (Denmark) reported that most of the results from the small countries are in the literature; he requested that the IAEA improve its distribution coverage.

(o) Dr. Joly (France) reported on studies of fission fragment total kinetic energy in U235, which he said showed no variation from resonance to resonance; this result is consistent with the constancy of $\bar{\nu}$. He reported studies on sub-threshold resonances and on evaluation of α for ^{239}Pu in the keV range.

(p) Dr. Slaus (Yugoslavia) named several facilities in Yugoslavia that are being used for neutron research, primarily for studies at 2.5 and 15 MeV. Belgrad, Ljubljana and Zagreb each have 200 keV accelerators, Ljubljana has a cyclotron (16 MeV deuterons and Zagreb has a 2.5 MeV Van de Graaff. Significant measurements are being made on radiative capture, (n,2n), (n,α), (n,p), (n,d), (n,2p) etc. reactions.

(B) From the N.D.U. of the IAEA

(q) Dr. Good (IAEA) reported on replies that had been received from liaison officers in IAEA geographical areas; most of the replies indicated that an increasing amount of data is to be expected in the future. Reporting in a general way on IAEA activities, Good took occasion of the first INDC meeting to summarise the various recommendations of the preceding INDSWG and Interim INDC; he showed that the IAEA had responded to about 75% of these recommendations.

III. COMMITTEE METHODS OF WORK

6. Dr. Kolstad presented a sub-committee report on the subject of methods of work. Under an item by this name, the Terms of Reference permit the Committee to organise and operate in the manner that it considers most appropriate to the task that it has to perform.

7. The report provided for a chairman who would serve for two years.

8. The report also provided for a committee secretary who would keep detailed accounts of the meeting for committee purposes.

9. All agreed that the document was for guidance only.

IV. SAMPLE PROBLEMS

10. Dr. Good reported that the Agency is at times asked to provide research materials, and as often as not is also asked to provide for fabrication of the samples. The subject was discussed without very conclusive results. However, the Committee was informed that the Agency has access to some materials that can be supplied subject to Board Approval. These materials, the Committee thought, could be released without the time-consuming Board Approval procedure for many research purposes and suggested that the Agency investigate the prospects.

11. Assay of materials and the fabrication of samples are separate matters; for these, the Agency has neither facilities nor funds; it could, at best, only act as negotiator at the present time.

V. MEETINGS

(A) Washington Conference

12. Dr. Havens discussed the Second Washington Conference on Neutron Cross Sections and Technology, 4-7 March, 1968. The comments which followed could be regarded as points to be considered when plans are made for the Second International IAEA Conference on Nuclear Data.

(a) Dr. Kolstad's opinion was that the Washington meeting failed to produce the interaction between measurers and reactor designers that had been hoped; between measurers and evaluators, however, the interaction seemed satisfactory.

(b) Dr. Havens suggested that more reactor oriented people should be induced to attend such meetings; his opinion was that a reactor physicist should be on the program committee.

(c) Dr. Joly suggested that such areas as astrophysics, radiation damage, etc. were areas of needs that might be considered in addition to those of the reactor field.

(d) Dr. Schmidt pointed out the need to promote feed-back of integral data through evaluation to the microscopic data.

(B) IUPAP Conference on Nuclear Physics

13. Dr. Havens called attention to the IUPAP conference in Nuclear Physics in 1970. It was generally agreed that the IAEA and the IUPAP conferences could both be held without conflict in the same year but that collaboration between the two program committees should be sought.

(C) Second IAEA Conference on Nuclear Data

14. Dr. Good also introduced plans for the Second IAEA International Conference on Nuclear Data for Reactors; he especially called for suggestions on invited speakers and on candidates for a program and selection committee.

(D) Other IAEA Conferences and Meetings

15. Dr. Good called attention to other IAEA meetings of interest to the Committee; he listed the Copenhagen Meeting on Inelastic Scattering (low energy), the Dubna Panel on Nuclear Physics, both in 1968; the Second Conference on Physics and Chemistry of Fission, the Meeting on Utilisation of Neutron Generators in Physics and Chemistry, both in 1969.

(E) Other Continuing Agency Groups

16. Dr. Good called attention to other Agency committees or working groups whose activity should be taken into account. He introduced Dr. Spinrad of IAEA who discussed these other groups in some detail.

17. Dr. Spinrad pointed out that cross section data was important to both the IWGFR and the IWGRM, i.e. the International Working Group for Fast Reactors and Radiation Measurements, respectively.

18. The possibility of joint sponsorship of meetings by these IAEA groups to bring the most strategic specialists together, was considered. The α for ^{239}Pu constituted a suitable situation for such collaboration, but no such action seemed called for at the time.

(F) The 1969 Panel for Nuclear Data

19. The Panel topic for 1969 was reconsidered and the opinion was unanimous that the subject should be changed to "compilation" on account of the developments taking place. The discussion resulted in a formal recommendation.

VI. EVALUATED DATA

The subject of evaluated data was placed on the agenda because of the growing need to exchange this information.

(A) Review of Evaluation in Member States

20. A summary was given of the status of evaluation in various countries. The growing importance of this activity was evident.

(B) International Exchange of Evaluated Data

21. Dr. Schmidt and Dr. Bell announced the decision to make the evaluated data at CCDN (Sacley) available for exchange (excepting, of course, that which originated in the U.S.A.).

22. By unanimous decision, the IAEA was instructed to begin a "Post-Box" evaluated-data exchange, modelled after the "Post-Box" principle by which the experimental data exchange was initiated; the activity was to start cautiously in a small way and in no case should it interfere with the experimental exchange.

23. Mr. Kinchin suggested that there might be a case for an Evaluated Data Request List similar to the existing Data Request List; the conclusion that emerged from the discussions was that there were still too few people involved to justify the effort.

(C) International Exchange of Data for Safeguards

24. In a different context, Dr. Kolstad raised the question of exchange of nuclear data for safeguards. Because the relevant document had not been studied in advance, the question was left for the next meeting.

VII. TOPICAL DISCUSSION

Ratio of Capture to Fission for ^{239}Pu

25. The session was opened with some introductory remarks by Dr. Brunson and Dr. Spinrad who outlined the dilemma in reactor physics that was occasioned by discrepancies in Alpha, particularly for ^{239}Pu, in the energy interval 0.1 to 10 keV. High values for this parameter relative to generally accepted ones, had recently been obtained by Schomberg et al. Such new values, if correct, would be of great importance in fast reactor design.

26. Dr. Joly reviewed the results of all the experimental data and presented the result of an evaluation by Barre et al. In the course of subsequent discussions he showed that the measurements, as conducted, permitted accuracies of 15% to 20% at best; reactor physicists find such a large uncertainty unacceptable.

27. Dr. Janeva presented the results obtained by Rjabov et al. using the pulsed reactor at Dubna. These results were of special interest because of the relatively lower values on α of ^{239}Pu that were obtained especially above 2 keV.

28. Dr. Rae discussed the controversial experiments of Schomberg and Sowerby; these were actually the first "direct" measurements to be made of α for ^{239}Pu with very thin samples. The measurements are continuing in an effort to discover and remove the source of the discrepancies that have been the cause of such concern.

29. Dr. Taschek mentioned briefly experiments that have been performed at Los Alamos and RPI, the results of which are still in the process of analysis.

30. Dr. Kolstad commented briefly on possible consequences to the U.S. fast reactor program of an α for ^{239}Pu as high as inducted by the Schomberg-Sowerby results. He suggested that in view of the new results that would be forthcoming in the next few months, the topical discussion might be continued at the 1970 INDC meeting.

VIII. COMPILATION

Reports which were submitted to the meeting by the data centers at Brookhaven, Obninsk, Saclay and by the Nuclear Data Unit showed changes taking place in all centers in regard to equipment, methods, philosophy etc. Such a situation affords favourable opportunity for promoting international data exchange and it is gratifying that the centers mentioned are taking advantage of it accordingly.

(A) Report from Brookhaven

31. The Brookhaven center reported on the general organisation of the compilation effort which is characterised by a certain separation of the evaluated data from the experimental data from which it is derived. The development of a new sophisticated data storage and retrieval system, SCISRS II, is of special significance. (The system is being devised with the idea that it is readily adaptable to other data centers and Brookhaven has welcomed participation in the development, especially in regard to suggestions and criticisms).

(B) Report from Obninsk

32. At Obninsk, according to statistics presented by Dr. Abramov, there is a slow but steady rise in interest and participation in the international data exchange effort. The CINDA reading which has covered the principal Soviet literature in the past is to be extended to include conferences also.

(C) Report from Saclay

33. The Saclay center quoted figures to show that the volume of available information at CCDN is growing steadily. As the first of the centers to have a new generation computer (IBM 360/30), the Saclay center has been able to work effectively toward the future. It has in operation an improved SCISSRS I storage and retrieval

system supplemented by a system devised at Livermore. In addition, the center will plan to participate actively in the development of the new Brookhaven SCISRS system. The improvements to the CINDA programs and operations reported by the Saclay center are evident in the CINDA 68.

(D) Report from the N.D.U. of the IAEA

34. The N.D.U. represented its data center activity as having a two-fold function:

(a) to actively promote the exchange between the principal data centers;

(b) to serve as a compilation center for those areas of the world which are not already effectively served by the other principal data centers.

It reported statistics to show the effectiveness of the present international exchange, both in regard to geographical participation and in regard to growth with time.

It reported on special efforts to stimulate the participation of its own geographical area in the compilation and exchange effort; the most rewarding of these was the field trip of one of the N.D.U. staff to the area of India, Asia and Australia.

IX. VISIT TO SEIBERSDORF

35. Wednesday afternoon was devoted to a visit to Seibersdorf by those committee members who were unfamiliar with the work going on there.

X. REQUEST LIST

36. The N.D.U. presented a compilation from its geographical area (the U.S.S.R. at the time was the only contributor) of those neutron quantities needed by reactor (or other) purposes, whose values either have never been obtained from experiment or have been obtained with insufficient accuracy so that further measurements are required.

(Note: The North American and Western European communities have had such a compilation (Request List) for some time; access by neutron physicists to its information has resulted in providing much needed information).

(A) Review of Present Requests

37. The committee reviewed the total listing of requests which consisted of the North American and Western European contributions plus those supplied by the N.D.U. (U.S.S.R.).

38. Good emphasised that the listing that had been provided was with the cooperation of ENEA, which has developed a computerised storage and retrieval system specifically to handle the North American-Western European Request List. The system, the compilation, and the listing are somewhat indiscriminantly referred to as RENDA (REquests for Nuclear DAta).

(B) INDC/IAEA Request List

39. Following a review of the list, a discussion took place concerning the need or desirability of a world-wide request list under the sponsorship of INDC (according to Good, this could easily be achieved by IAEA with the continued cooperation of ENEA, based on RENDA).

40. Opinion was strong that such a compilation was an important instrument, and that it should be placed on a world-wide basis.

41. ENEA spokesman proposed that the transition to a world-wide RENDA was already opportune.

42. Committee opinion, however, was that adoption of an INDC-RENDA should be postponed: (a) to allow for examination of a draft prototype, (b) to permit further consideration by the IAEA geographical area countries concerning the value to them of their participation, (c) to permit the inclusion of well-documented request lists from other IAEA Member States, and (d) for further discussion at the 1969 meeting of INDC.

XI. FACILITIES LIST

(A) Review of Status

43. Dr. Good reviewed the status of the "Facilities List" noting that it had originally been a joint IAEA/ENEA undertaking; that it had as its purpose to publish a list, world-wide, of facilities which were in whole or in part for the study of neutrons;

that the compilation was to have been published based upon information that had been received as of an arbitrary cut-off time;

that the original objective was considered accomplished when the available information was given a U+ distribution.

(B) Recommendation from EANDC

44. Mr. Kinchin read a resolution which was addressed to the INDC by the EANDC. The resolution called upon the IAEA to assume full responsibility for maintaining the facilities compilation.

(C) Consideration of Need for Facilities List

45. The N.D.U. recommended that the compilation should be a continuous one (such as the data compilation) and that information from it, whether all or in part, should be on request.

46. It was recognised that such a compilation was an effective means to disseminate information about new instruments.

47. After considerable debate, the conclusion was that the compilation was worthy of effort.

XII. REPORT ON THE 2200 m/sec FISSION CONSTANTS RE-EVALUATION

The first neutron data compilation of the N.D.U. was accompanied also by an evaluation of that data. The circumstances were rather special since the data consisted of the cross sections of the fissile nuclides at 2200 m/sec. Because these data are limited in number, because they are in the nature of standards for which world-wide acceptable values are an obvious need, because the N.D.U. should not be 100% divorced from evaluation activity, and to maintain continuity of program; new data on these cross sections have been monitored continuously since the first evaluation so that best values for them have been always available from the IAEA.

To maintain confidence that the values of these numbers furnished by the IAEA are the best obtainable, a group of experts consisting in part of the original group, but with new participants from U.S.A. and U.S.S.R., met to review the original evaluation and examine new data.

48. A preliminary short report of the work was submitted to the Committee by its Chairman, Dr. Westcott, and additional remarks were supplied by Mr. G. C. Hanna and Dr. H. Lemmel.

49. It turned out that the task of re-evaluation was greater than originally expected, because considerable new data were available, and stimulating new thinking, including some revisions in the analytical procedures was introduced.

50. In the opinion of those who took part, the re-evaluation was essential to achieve maximum benefit from developments that have taken place since the first effort.

51. In view of the growing need to introduce the results of integral measurements, either as input or as check information, it is already foreseeable that a further re-examination similar to the present one will be needed.

XIII. STANDARDS

(A) Review of Brussels Panel Report

52. Dr. Spaepen reviewed item by item, the technical recommendations of the Brussels Panel on Neutron Standards, 8-12 May 1967.

(B) Review of Recent Measurements

53. On the basis of a survey of measurement activities which have been made, Dr. Spaepen was able to report on progress in the areas of these recommendations.

54. The committee took real exception to only one of the Panel's technical findings: gold, in spite of all the effort to obtain consistent results, still remains doubtful as a standard for radiative capture measurements. The Panel advocated that work should continue on gold to remove persisting uncertainties.

55. The Committee suggested that gold should be dropped as a standard altogether.

(C) Considerations of possible IAEA activities

56. The Committee considered the Panel's suggestions in regard to actions that the IAEA could take to motivate and encourage standard work among the countries of the world. These are reviewed under a succeeding item, Informal Suggestions.

- FORMAL RECOMMENDATIONS -

57. After discussion of the items on this agenda, the participants agreed on the following recommendations:

1st Recommendation

The Committee notes the plan for an international conference on nuclear data in 1970. The Committee strongly endorses this proposal and suggests that so far as possible the program is coordinated with that of the 1970 IUPAP Nuclear Physics Conference.

2nd Recommendation

The Committee recommends that the proposed 1969 Panel be devoted to the subject of nuclear data compilation, and should be held as early as possible, consistent with full participation. In addition, it would appear very desirable to hold a four-centre meeting in the intervening period and to make available the conclusions of this meeting prior to the meeting of the Panel.

3rd Recommendation

In view of the world-wide nature of the CINDA bibliographical index, the Committee recommends that the IAEA consider taking over the responsibility for its printing and distribution at the earliest practicable date.

- INFORMAL SUGGESTIONS -

Standards

The Brussels Panel on Nuclear Standards for Neutron Cross Section Measurements had made a number of recommendations for IAEA action, which in its view would promote "Standards" activity. The original Recommendations are given in Annex I.

58. The INDC reviewed the findings of the Brussels Panel and made the following suggestions and opinions in regard to its seven Recommendations.

(1) IAEA promote access to available materials and services. The Committee supported this suggestion from the Panel.

(2) IAEA promote exchange of personnel and equipment. The Committee suggested that the IAEA should make a specific recommendation.

(3) Second IAEA Panel on Standards. The Committee thought that another "Panel on Standards" would be appropriate in 1971.

(4) IAEA Compilation of Standards Activities in Member States. The Committee suggested that the call for Progress Reports (from each Member State) should also call for a statement on standards activity in the respective States.

(5) IAEA consider extending evaluation to other standards. Further evaluation activity should be postponed until after the 2200 m/sec. evaluation had received further assessment.

(6) IAEA through INDC monitor measurements such as proposed in Panel Report. Was being done.

(7) IAEA through INDC promote repetition of standard measurements. Was being done.

GENERAL

59. During the discussion of the items on the agenda, the following actions were encouraged:

(a) Facilities list - continuation of the facilities list as it is the means to announce new instruments (proposed new instruments should appear in the Progress Reports only).

(b) Exchange of Evaluated Data - initiation of the exchange of evaluated data on exactly the same basis as the experimental data exchange was initiated (the Post-Box); caution was to be used to keep the exchange limited; and in no case was it to interfere with the experimental data exchange.

(c) Liaison Officers for each Member State - distribution to a larger audience of IAEA activity in the area of "nuclear data" by the extension of the liaison officers to include all Member States.

(d) Distribution of Committee Minutes - the distribution of the Committee's unapproved minutes to each Member State.

GENERAL RECOMMENDATIONS TO THE I.A.E.A.

1. A number of laboratories and especially the centers for nuclear standards have special materials and services which they can make available for standards activities. The IAEA should effectively publicise this fact and its related information and if called on, assist with necessary arrangements for obtaining these.

2. In certain circumstances, it may prove desirable to exchange personnel or equipment or provide some appropriate common facility to resolve a persistent discrepancy. The IAEA should consider in such circumstances, if desired, to locate and contract for use of the required facility and make necessary arrangements for the equipment and/or personnel exchange.

3. The IAEA should consider organising a future panel similar to the present one, in about four years' time.

4. The IAEA should conduct a complete survey of neutron cross section standards activities.

5. In view of the apparent shortage of evaluated data for standards purposes, it is recommended that the IAEA continues or extends support for such activity. This topic, however, was not examined in detail by the Panel.

6. The IAEA should, perhaps through the INDC, seek to monitor the progress in implementing the technical recommendations set forth in this report.

7. The IAEA should seek, perhaps through the INDC, to encourage duplication of important measurements.