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International Atomic Energy Agency

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(Additional distr.: Participants in Working Group)

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

INTERNATIONAL WORKING GROUP

ON NUCLEAR STRUCTURE AND REACTION DATA

MINUTES OF FIRST MEETING

Vienna, 13 - 17 March 1972

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

INTERNATIONAL WORKING GROUP ON NUCLEAR STRUCTURE AND REACTION DATA

MINUTES OF FIRST MEETING

13 - 17 MARCH 1972, in VIENNA

1. INTRODUCTION

The Deputy Director General of the IAEA, Mr. Finkelstein, opened the meeting with a brief review of the historical development of the international cooperation in the neutron data field. The increasing importance of non-neutron data required that this Working Group establish an interface between the user community and the compilers and evaluators, bearing in mind that the IAEA can play only a limited role because of the limited means at its disposal. The Group was also to consider whether or not there is a need for its continued existence. If so, the INDC would ask the Director General to set up a permanent Working Group.

G. Bartholomew was nominated and accepted as Chairman of the Working Group. Participants then introduced themselves, each in turn, noting their affiliation and area of interest.

After a brief discussion of meeting room mechanics and the tabling of documents, B. Allen was nominated and accepted as Executive Secretary, with responsibility for the minutes of the Working Group. It was agreed that the subsequent program should follow that given in Document 1.

The Chairman then considered the terms of reference, methods of work and title of the Working Group, emphasising guidelines given in Documents 3 and 4 by the consultants group as modified by the INDC. An ad hoc committee was set up to consider this subject, comprising B. Grinberg (Chairman), D. Horen, A. Wapstra, V. Kulakov, G. Bartholomew, L. Hjärne and J. Schmidt. This committee, taking cognizance of the wishes of the Working Group, was to present a draft for approval on Friday, March 17. The accepted draft would then be forwarded through the INDC to the Director General.

Bartholomew reviewed the aims of the Working Group, referring to Document 3, Appendix 1. These were to establish guidelines for the compilation, evaluation and dissemination of nuclear data, to review the status and needs for data and to investigate means of satisfying the needs of the user community. The INDC amendment that the Working Group should be responsive to the high priority users was noted. The group was not asked to take hard action, but could define tasks for the future, designate some division of labour for follow up activities

and set standards.

2. PLENARY DISCUSSION

(a) Discussion of Subgroups

L. Hjärne outlined a proposed subgroup breakdown in terms of his experience in the neutron data field. A summary of subgroups and priorities is given in the table.

	Compilation	Evaluation	Application
Abstracting and Indexing services	1	2	2
Author's guide	2	1	2
Feedback	2	2	1

The abstracting and indexing services would include recent references, key words, nuclear science abstracts, International Nuclear Information System (INIS), specific parameter indexing and possibly a non-neutron CINDA. International collaboration will be required to generate a comprehensive input.

The author's guide, designed for the producers of nuclear data, would ensure that papers contained a uniform terminology and the necessary information required by compilers and evaluators.

Feedback refers to a mechanism whereby users can communicate with the compilers and evaluators via request lists, news letters, questionnaires and topical meetings.

Hjärne proposed that the second priority (2) items be considered first by the C, E and A subgroups, so all views would be available for consideration of the first priority items. In this way each member of the Working Group could input to the major activity of each subgroup.

In a brief summary of Hjärne's comments, Bartholomew supported the proposed subgroup divisions. When F. Fröhner commented that the isolation of subgroups was undesirable, Bartholomew suggested that a plenary session should be held each morning to review subgroup progress. In answer to Grinberg's question regarding interpreters for subgroups, it was stated later that only one subgroup could be so served (the application subgroup). D. Horen emphasised the need for both short and long term goals, recalling many meetings on compilations which had little substantive output. Well defined short term goals were therefore required. Horen also related some thoughts on Nuclear Data compilations

(Document 6) covering such areas as the use of research scientists as compilers and evaluators, journal cooperation and the key role of the funding agencies. For example, the Nuclear Data Project knows well what to do, but is limited by the funds available. There are two categories of users - the basic researchers who tend to do their evaluations and those who work in applied areas. These users have different needs and it may be necessary to reformat thorough compilations for the applied users. Horen suggested that the primary order of business is to examine what is available and funded and to consider how best to support this work.

There was general agreement though on the importance of the applications area. Schmidt, in particular, noted that the real purpose for the existence of the Working Group derives from the applications area, but that this area was poorly represented at this meeting.

Several participants felt that it was too early to break up into sub-groups, that some important subjects should be discussed in plenary.

Horen suggested a 'straw poll' on status to expedite the meeting, believing that the compilation and evaluation aspects could be quickly dealt with. Again there was general agreement (after the term 'straw poll' was explained) though Grinberg pointed out that an in depth treatment of evaluation would take time. The concept of precision in evaluation was discussed by Horen and Kulakov, who noted that there was insufficient manpower to do the complete job. It was therefore necessary to find the most important applied areas and work in these.

The meeting adjourned for lunch (Monday, March 13).

(b) Status Reports from Participants

Short presentations were given on Monday afternoon covering the compilation and/or evaluation activities of most members of the Working Group. These activities are summarised in Appendix A of the Working Group's report and are therefore not reported here. However in the discussion sessions some interesting comments were made which are noted below.

Generally speaking, compilation and evaluation work is carried out by experimentalists (on a part time basis) who are experts engaged in research in the appropriate field. The compilation therefore concerns primarily the compilers own needs and those of other basic researchers.

With regard to the international collaboration of compilers, Horen

asked if current difficulties could be reduced if an international agreement was reached between the USSR and USA. Both Kulakov and Rudakov indicated that this would be so (see Document 9). Berenyi called for international collaboration to eliminate the backlog in the compilation and evaluation of nuclear data and stressed the need for specific tabulations (such as that of Martin Blichert-Toft (MBT) for applied users.

An important aspect of the activities of the Nuclear Data Project at Oak Ridge is the current collaboration with many national and overseas groups. The project is moving towards a comprehensive computer data file, comprising bibliography (in existence) and separate compiled and evaluated data files (planned). This is a system similar to that used in the neutron data field. While much of the A-chain backlog is expected to be taken up by 1974 under the NIRA program, the continual updating of the data will remain a problem. The project is ready to accept requests for selected reference lists from outside users.

The nuclear data project basically compiles nuclear structure data while the charged particle reaction centre, under McGowan, maintains a bibliography of reaction data but does not do evaluation work. An extensive compilation and systematic study of charged particle reactions was reported by Münzel of Karlsruhe. This group uses the McGowan bibliography, but that is the extent of the collaboration. The Karlsruhe group also produces a chart of nuclides, but there is no collaboration at all with the corresponding US group of N.E. Holden at KAPL.

Ferguson noted that while the fusion and fission reactor interests are well organized, other applications areas have no coherent funding organization. However, Wallin reported that a National Data group is to be established in Sweden to serve the 'unorganized' applied users.

Ferguson also noted that the diverse applied users are often not aware of the latest compiled and evaluated data. An international centre was needed which kept up to date with compilation/evaluation activities (Horen, Spernol).

The International Nuclear Information System (INIS) was described by Zh.Turkov (IAEA). This system is decentralised, and scientists must deal with the national liaison officer who collects and distributes data. Turkov would supply a list of these officers and their addresses for the minutes of the meeting (see app. I).

Rapeanu called for a compilation of group constant sets and an evaluation of reactor codes. Fröhner pointed out that group constant sets are geared to specific reactor codes. Nevertheless, the computer

program library at ISPRA contains many reactor codes with appropriate constant sets.

Bartholomew and Allen discussed the need for an evaluation of the large volume of thermal neutron capture gamma ray data. While the keV neutron range is being compiled, no effort has been made to date in the eV neutron energy range.

Grinberg called for an international effort to share the workload in the detailed evaluation of radionuclides conducted by the 'Euratom' group. This work achieves the highest possible accuracy whereas the MBT tables, useful for medical applications, represents a quick evaluation. Spernol noted 10 to 15 per cent discrepancies in fluorescence yields between the two evaluations. Grinberg expected that radionuclides, once evaluated, would be kept up to date.

(c) Review of Data Fields

On Tuesday morning, March 14, Schmidt gave a review of the neutron data cycle which includes measurement, compilation (CINDA, EXFOR) evaluation and users with a feedback via the RENDA request list. Such a system required a high degree of international cooperation and some 12 to 15 years to develop. Fröhner hoped that the nuclear data situation could be handled more expediently because of the experience available at IAEA. Spernol had earlier noted that the nuclear data situation differed historically from the neutron data field as many groups are already in existence. It was pointed out by Frohner that both users and measurers sit on the EANDC committees for requests and funding.

Schmidt went on to summarize the Scharff-Goldhaber Report (Document 3). If sufficient funds and manpower were available, it would be possible to do without a RENDA type of request list. Otherwise such a list is needed, with an appropriate assignment of priorities.

Defining user fields, data fields, communication media and priority, Schmidt went on to categorize the various aspects of the nuclear data field. This survey is summarised in the following table. The task of the Working Group is to define which user fields exist, which data fields are needed with what priority, and how the users can obtain the data they need.

Fröhner stressed the need for γ-ray data on magnetic tape (quoting Drake) and noted that the Australian studies at fast neutron energies should be strongly encouraged.

User Field	Data Field	Media	Priority	Contributor (Document No.)
Fission reactor	Levels, (n,n')	ND sheets Computer mag-tape	1	NNCSC (19)
Shielding	Capture γ-rays γ production (n,n'γ)	Table of isotopes Mag-tapes Bartholomew-Groshev Lucas Heights	1	Bartholomew 4 centres
Safeguards			1	Byer (20)
Fusion	n, some charged particle, (γ,n)	McGowan		Lemley (21)
Medicine		MBT Table of isotopes		Palmer (22) (8)
Biology and Agriculture		Table of isotopes ND sheets Chemistry handbook		
Activations and Radioisotopes (geology, mining, forensic, environment impurities, dosimetry, industrial)	γ, β, α, half lives charged particle			
Chemistry				
Astrophysics	n charged particle masses			
Space research				

The question of priorities was discussed with Allen and Ferguson noting the lower priorities for shielding data in RENDA and in the U.K. Wapstra considered that the matter of priorities should be considered last. Van de Leun later noted the low priority for astrophysics and asked whether the economic fallout determined priorities. Both Bartholomew and Schmidt agreed that the Working Group must be responsive to economic considerations.

A survey (Document 8) was quoted which indicated the high usage by the medical profession of radioactive isotopes - some 30 isotopes being used in research with $^{131,125}I$, ^{54}Fe for therapy and ^{51}Cr, ^{137}Cs and ^{60}Co for scanning and diagnosis.

Further reports were presented by Palmer (Document 22) on nuclear chemistry and Byer (Document 20) on safeguards. Palmer emphasized the need for better data with error estimates, but noted that in general chemists were not prepared to pay for it. The radio-pharmaceutical industry is a major user of data, offering an increasing number of nuclides. However, the available data is often good enough for most purposes, though better data were needed for activation analysis. The advent of table top cyclotrons is creating a need for charged particle cross sections for short lived radioisotopes production. Shorter half life isotopes (^{13}N, ^{18}F, ^{123}I) are preferable for diagnostic purposes and there is a definite trend to charged particle production.

Münzel noted that Karlsruhe will be publishing such a compilation of reaction cross sections for p, d, ^{3}He, ^{4}He, Li, C...A, by the end of the year (Landolt - Börnstein). However, the data have not been critically evaluated. Systematics of excitation functions for alphas and thick target reaction yields have also been tabulated.

Byer expressed the needs of safeguards in terms of

(a) requests for precisely defined data, as put forward by the producer or evaluator,

(b) ill-defined or generalised requests from the outside users.

Noting the very small expenditure on research and development for safeguards, Byer emphasized the requirement for screened requests on an official basis.

The scheduled report on fusion needs by Lemley (Document 21) was postponed in order that the Working Group proceed with the formation of the subgroups.

(d) Formation of Subgroups

Horen declared that the group had been presented with sufficient information on 'the gory details of data needs' and asked that it push on to define what can be done and then do it. The broad usage of nuclear data had been amply demonstrated and it was necessary now to alleviate the problem. There was general agreement and the meeting therefore considered the formation of three subgroups.

The Chairman listed the proposed subgroups with their respective chairmen and participants. Somewhat different from that originally suggested, the subgroups were:

Status (S) : Chairman - Allen

Evaluation (E) : Chairman - Wapstra

Application (A) : Chairman - Michaelis

After a few changes of participants from one subgroup to another, Allen queried the disappearance of the compilation subgroup. It was generally felt, however, that a status report on the existing activity should take priority and would be useful to the Evaluation and Application subgroups as a basis of work.

The afternoon (Tuesday) was declared free for perusal of the numerous documents submitted to the meeting.

Short subgroup reports were presented on Wednesday afternoon without discussion.

A plenary session was held on Thursday morning in which further progress reports were given by each subgroup. The status subgroup had prepared a form summarizing the activities of the various data groups represented at the meeting as well as many not so represented, and a compilation of compilations. A newsletter was also suggested. Comments following Allen's report emphasized the need for national centres, collaboration with USSR and the international exchange of compilers. Wapstra (Evaluation) discussed a questionnaire designed to survey needs for compilations, and the requirements of author and evaluator guides. The promotion of compilation and evaluation endeavours was recommended, together with the need for developing existing bibliographies.

Michaelis (Applications) discussed an international request list for measurements and compilation/evaluations and suggested that a questionnaire be presented at the forthcoming conference on activation analysis at Karlsruhe.

Much of the subsequent discussion covered the needs of the applied user. The quality and availability of data were declared important, though in many cases needs were often satisfied by older data. Michaelis noted that the ability to innovate in applied areas depended on the available data while Berenyi emphasized that with the rapid development of technology nuclear data not needed yesterday could become quite important today.

Horen asked whether the bulk of data was being handled satisfactorily and noted that this was the first problem to be considered. There was

however agreement as to the basic importance of the bulk compilation and evaluation activities of, for example, the Nuclear Data Project and the Euratom group. However, detailed requests were needed from users to determine the most relevant applied compilations. Horen noted the difficulty in obtaining information in the U.S. on the needs for non-neutron data in reactor physics, while Ferguson was sceptical as to the economic importance of these data.

Kulakov queried the lack of specific information on needs in many fields. While in some cases this might not be so (e.g. fission reactors with RENDA, shielding with RSIC) there were a number of areas where this was clearly the case.

The plenary adjourned to meet again Friday morning. Because the Evaluation and Applications subgroups called for extra time, the Friday plenary commenced late, 11 a.m., leaving insufficient time for the formulation of a final set of recommendations from the Working Group as a whole.

3. SUBGROUP REPORTS

(a) Status

Presented by Allen, the report concerned the documentation of the current status of compilation and evaluation activities. A list (not claimed to be complete) of compilations and a summary of the activities of many groups was tabled. Recommendations made were:

(i) The distribution of a C. & E. newsletter, issued twice a year, containing one page contributions from as many groups as possible.

(ii) That efforts be made to encourage the further compilation and evaluation of neutron capture gamma ray data.

(iii) That the IAEA ask member states to actively participate in supporting nuclear data activities at the major compiling centres, specifically at the Nuclear Data Project, Oak Ridge, Institute of Nuclear Chemistry, Karlsruhe, Euratom Group, and at a regional centre in the Soviet Union which could be set up to facilitate the exchange of data.

In the discussion following this report, Horen noted that the Nuclear Data Sheets evaluated capture gamma ray data, but only in terms of nuclear structure. Wapstra commented on an overlap with the Status report and that of the Evaluation subgroup and asked that discussions

be deferred until that report was given. Berenyi questioned whether atomic data should be included. The concensus of opinion was that it should not be considered at this stage. Horen asked that the charged particle reaction centre at Oak Ridge be considered with the Nuclear Chemistry group at Karlsruhe as the major compiling centres for charged particle compilation activity. In answer to whether Japan should be specifically mentioned, Sakai suggested that this was not necessary.

Appropriate changes were made to the Status report which was distributed later in the afternoon.

(b) Applications

This report was presented by Michaelis and considered various aspects of the following application areas: fission reactors, shielding, safeguards, fusion, activation analysis and isotope production, astrophysics and space research, and special topics. The group attempted to relate the most important data fields relevant to these user fields. The basic importance of the work of the Nuclear Data Project was noted and the subgroup recommended that the work proceed as quickly as possible.

There was some discussion as to the role of the INDC in the development of an international request list for measurements and evaluation of data pertinent to fission reactors. Wapstra and Fröhner felt that the INDC was not suitable. However, Byer pointed out that only the fission reactor category was specified and that the INDC has good channels of communication to reactor physicists.

With respect to the shielding area, Horen was asked to check with RSIC at Oak Ridge as to whether their service is national or international. RSIC might also specify data needs in the shielding field.

In the safeguards area, the IAEA has received official data requests from three of its member states. When finalised, the lists will be widely distributed. The need generally, however, is for measurement rather than evaluation.

In the discussion on fusion, the original emphasis on new measurements rather than compilation and evaluation was debated by Ferguson. Horen claimed that the Working Group has no business dealing in the measurements area. Lemley and Hjärne stated, however, that measurements will be needed and that it was the responsibility of the Working Group to forward to the INDC any new information of this kind that may come to the Working Group's attention. Because of the well defined role of the IAEA and INDC in this area, no immediate action by the Working Group was required. The INDC should inform the Working Group if and when a need arose for

compilation and evaluation.

In the activation analysis area, direct action was recommended for the forthcoming conference at Karlsruhe. A survey of needs would be presented at the next meeting of the Working Group following the distribution of a questionnaire at that conference. The question of errors was discussed by Golashvili and the subgroup recommended that work on error propagation should be continued. Van de Leun noted that most nuclear physics journals are often reluctant to publish compilation papers.

The importance of the activities of the Euratom Group in the radioactive decay data was stressed, and it was felt that the evaluation work should continue with increased pace.

In the subsequent discussion, Horen noted that the detailed evaluations of the Euratom group may not be as suitable for medical purposes as, for example, the Martin Blichert/Toft tables. Discussion then centered on increasing the emphasis on this type of applied compilation (Horen, Wapstra, Berenyi, Allen), while Wallin commented on the necessity to determine the real needs of the medical community. Noting the follow up in the activation analysis area, Allen suggested that a similar follow-up be made in the radioisotope field also. He further suggested the need for on-going activity in all these areas of application. In answer as to who is prepared to do the work, Allen stated that the role of the members is not to do the work, but to obtain contributions from experts in their respective countries. Schmidt emphasised the lack of follow up in the radioisotope area, while Berenyi suggested that such activities should be postponed for subsequent meetings of the Working Group. Noting that as in the case of activation, meetings are held periodically in various applied fields, Allen asked whether the IAEA could monitor these meetings. Schmidt indicated that the Working Group should supply volunteers. The matter was left floating.

Berenyi was asked to report on the importance of X-ray fluorescence at the next meeting of the Working Group.

In the discussion on astrophysics and space research, Wapstra volunteered to obtain requests from the International Astronomical Union. Golashvili mentioned the contacts of CODATA with the Union also and the useful information published in the CODATA newsletter.

In the special topics category, Allen asked about the compilation of high energy data. Schmidt introduced a letter from Dubna (Document 23) which discussed the large amount of high energy data on elementary particles. Berkeley, CERN and Dubna already have a data exchange, and Byer noted that a great deal of collaboration is already taking place with CERN and that the Working Group would be going outside its limits to consider the elementary particle area. The reference to neutrino studies was deleted (Wapstra, Bartholomew).

(c) Evaluation

The report of this subgroup was presented by Wapstra. The subgroup noted the NIRA scheme which would bring the 'bulk compilation' situation up-to-date in 3 years. The essential question of continuing compilation after that time was not yet answered. The report encouraged all actions that can update compilations such as international collaboration, via secondments of scientists to compilation groups and designated responsibility for various A chains. The need for more specialized tabulations was noted and a survey was suggested of the needs in both pure and applied sciences. The survey would be coordinated by the Scientific Secretary. Preferred to a CINDA type system was the extension of the Nuclear Data Project's reference system, whereby a satisfactory bibliography could be obtained with the least difficulty. Development of a computer storage and retrieval system for limited subject areas was encouraged and an author's guide for distribution to journal editors was also presented. Comments on this guide are to be presented to the Chairman by April 30.

In the subsequent discussion, Allen noted the strong reliance and emphasis on the Nuclear Data Project and Schmidt noted the overlap with the report from the Status subgroup. Wallin and Münzel observed that only structure data was considered, though Wapstra stated that this of course was not intended. Da Silva asked if only the Nuclear Data Project was prepared to collaborate. It was understood that Horen and Ferguson together would reword sections 1 and 2 of the report.

Hjärne and Schmidt noted the substantial task asked of the Scientific Secretary (section 3) and called for assistance from members of the Working Group. Ferguson considered that a large amount of decentralization had to be accepted, with ultimate coordination from Vienna. Sakai supported this concept in terms of national committees.

(d) Terms of Reference

The terms of reference were presented by Grinberg. The new title

for the Working Group was accepted to be 'International Working Group on Nuclear Structure and Reaction Data' (Schmidt).

Bartholomew and Allen agreed to act as Chairman and Secretary until the next meeting.

Changes to the INDC proposed terms of reference are:

(i) that the Working Group would keep the INDC informed of recommendations (rather than be the sole channel for communicating with IAEA). Recommendations which would imply any financial commitment should have the prior approval of INDC. The translation of the term 'tout-a-fait steriles' in the new version was objected to by Byer and was deleted.

(ii) The sentence 'no more than one member will be appointed from any one country' was omitted. Van de Leun noted the need for more U.S. participation at this Working Group and suggested that the new version be changed from 'would not hamper' to the more positive 'may stimulate'. Hjärne commented that, according to standard procedure followed by the IAEA, the invitation letters would be sent to Member States without specifying number of representatives.

(e) International Symposium

The discussion of the original program for this meeting (Document 4) centered on the need for greater participation by users. In answer to a query by Bartholomew as to whether the Working Group would make a contribution to the Symposium, Grinberg suggested that the Chairman should present a summary on behalf of the group at the beginning of the meeting.

A program committee was to meet the following week to revise the proposed program. The revision was distributed to members after the meeting for approval and comment by April 30, 1972. The Symposium is to be held in Paris, March 12-16, 1973.

The meeting concluded at 5.00 p.m., Friday, March 17, 1972, on the understanding that a set of recommendations would be culled from those of all the subgroups by the scientific secretaries. These recommendations are to be distributed and approved by the Working Group as a whole.

B. J. ALLEN
EXECUTIVE SECRETARY

ANNEX I

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