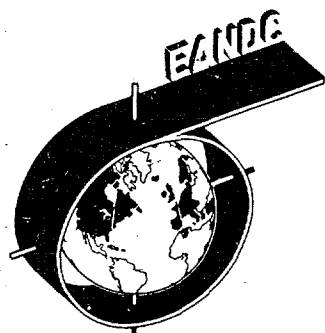


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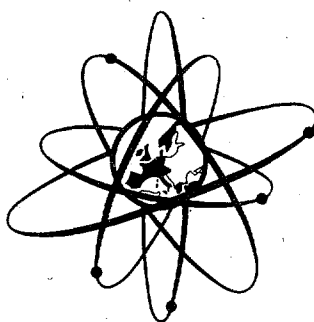


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FIRST BIENNIAL REPORT OF THE ACTIVITIES OF THE EUROPEAN AMERICAN NUCLEAR DATA COMMITTEE

R.F. TASCHEK and C.H. WESTCOTT

February 1963



EUROPEAN NUCLEAR ENERGY AGENCY

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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EUROPEAN AMERICAN NUCLEAR DATA COMMITTEE

by

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Paris 16ème.

FIRST BIENNIAL REPORT OF THE ACTIVITIES OF THE
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This report briefly summarizes the status and accomplishments of the European-American Nuclear Data Committee (EANDC) over the period January 1960 to January 1962.

A meeting of representatives from ENEA, Euratom, the United Kingdom, Canada and the United States, held at Centre d'Etudes Nucléaires de Saclay on 28th and 29th September 1959 and chaired by Mr. Pierre Huet, Director-General of ENEA, established the Terms of Reference for EANDC which in slightly modified form were later approved by the ENEA Steering Committee and appropriate United States and Canadian authorities.

The functions of the Committee, as defined in its terms of reference, are to "assure maximum advancement of the peaceful uses of nuclear energy by means of full and effective collaboration in the measurement of nuclear properties of general importance". Specifically the Committee concerns itself primarily with nuclear cross sections relevant to the nuclear energy programmes of the constituent organizations. Thus the whole area of measurements, the equipment and technologies used to obtain such measurements, the provision of the isotopes of interest, distribution of work load and personnel and, finally, the compilation and assessment of the adequacy of the data are amongst the main interests of the Committee. These same problems on more regional scales are dealt with by counterpart committees within ENEA and Euratom and the individual countries.

In attempting to define and limit the scope of the Committee, it was found necessary to exclude from consideration those measurements of reactor physics applicable primarily to specific systems. The boundary between such "integral" measurements and the more clearly defined microscopic measurements is not well-established and, following a period during which a "watchdog" sub-committee worked on this problem, EANDC recommended to ENEA that a Reactor Physics Committee counterpart to EANDC be formed to deal with clearly integral measurements. Such a committee has since been formed through ENEA.

During the period of this review, three regular meetings of EANDC were held. The first in Stockholm from 4th to 8th March 1960, the second from 15th to 18th November 1960 at Oak Ridge, and the third from 18th to 21st July at Harwell. A major topical symposium was held under EANDC auspices from 24th to 27th July 1961 at Saclay.

Following the establishment of EANDC it was recognized in the United Kingdom, Canada and the United States that many of the functions of the new committee overlapped those of an earlier regional one, i.e., the Tripartite Nuclear Cross Sections Committee. EANDC was therefore invited by the TNCC to assume the responsibility for a larger share of the functions previously handled in TNCC, and these responsibilities were accepted at the Harwell meeting of EANDC.

Taking particular agenda items individually, the following areas of action may be noted.

1. Nomenclature, symbolism, definitions and compilation activities

While agreed definitions of "microscopic" cross sections for a particular neutron energy are easily reached, the specification of infinite dilution resonance integrals provided a rather thorny problem which was subjected to detailed study by a sub-committee and finally resulted in a report recommending agreed-upon definitions.

EANDC has also studied the activities of groups in various countries working in the compilation field; examples in North America are the data compilation centres of the Brookhaven National Laboratory, the Argonne National Laboratory and the Canadian National Research Council. The Committee has also interested itself in explorations which the International Atomic Energy Agency is making in the field of international data compilation. The prime area of concern to EANDC consists of those nuclear data compilations more directly applicable to the needs of the users represented by the Committee.

2. Facilities compilation

Since a comprehensive compilation of facilities applicable to the research and measurement needs of the EANDC constituent organizations did not exist, steps were taken to fill this gap. A loose-leaf catalogue covering radiation sources, accelerators, research reactors, etc., was established and is kept up-to-date.

Such a compilation allows evaluation of possibilities and limitations on work which might be performed in laboratories not directly represented on EANDC. In some cases equipment loans or mutual use of equipment may also be facilitated by a general knowledge of what is in existence.

3. Technical assistance and advisory functions

Technical guidance and assistance from EANDC has been requested and given to laboratories in Austria, Greece, Portugal and Spain. These are laboratories which are in the process of building up nuclear measurements activities.

As appropriate for each case, equipment, equipment drawings, target materials or merely programme advice and encouragement have been offered or given.

4. Targets and samples used in the conduct of research and measurement

Nuclear cross-section measurement programmes obviously require targets of the elements, nuclides, or materials on which the measurements are desired. Considerable effort must be expended in time and cost to procure the material initially and then fix the necessary parameters (mass, chemical and isotopic composition, etc.) with sufficient accuracy to satisfy the needs of the experimenter. The prime function of EANDC in this area has been to attempt to optimize the utilization of the diverse facilities in the constituent countries and organizations pertaining to the target problem, to recognize lacks or weaknesses and to suggest corrective measures. Examples of EANDC activity have been as follows:

(a) Isotope production. Large-scale electromagnetic separation of isotopes for use as targets has been concentrated in the United States and the United Kingdom. EANDC has recommended that isotope pools in these countries be utilized under appropriate loan or purchase conditions to satisfy high priority measurement requirements of EANDC, rather than build more isotope separators and special chemical processing laboratories. EANDC also helps formulate the overall quantities and purities of the isotopes needed.

(b) Exchange of samples. In several cases, rare samples which have already been prepared for one set of measurements have been scheduled to be sent to other laboratories to extend ranges of measurements or to make new ones. A specific example of this procedure has been the loan of already fabricated samples of U²³³ from the Oak Ridge National Laboratory (ORNL) to the French Atomic Energy Commission Laboratories at Saclay to extend total cross-section measurements with a better neutron facility and therefore improve necessary knowledge of the resonance parameters complementary to the measurements made at ORNL and the Phillips Petroleum Company, Idaho.

(c) Foil and target preparation. For the wide variety of target materials used in carrying out measurements of interest to EANDC, many fabrication and deposition techniques must be learned and applied. The problem of carrying out such foil and target fabrication in a professional manner has become so acute in recent years that EANDC readily supported the suggestion that a European laboratory should attempt to establish a general facility for this purpose, whose services would be available to the constituent members and other laboratories.

A foil and target fabrication facility, established by the Euratom Commission, is now in partial operation and may be expanded, depending upon the volume and breadth of work which will materialize during stage I. Stage I is that during which the services of the facility are mainly reserved to the Euratom Community, although for countries outside the Community targets will also be prepared on a limited scale. At the same time, ORNL has also established a foil and target preparation centre with similar functions so that between the two facilities the needs of the Western countries in this area should be well satisfied.

Satisfactory methods of distributing supplies of target raw materials, isotopic or otherwise, have been worked out and guide lines determined for the application of EANDC request list priorities to the production of targets of EANDC interest.

5. Nuclear standardization laboratories

In the countries represented on EANDC, the U.K. National Physical Laboratory and the U.S. National Bureau of Standards perform a number of nuclear standardization services, but these are only a small portion of the total activities of these laboratories and far from complete requirements, appearing out of the general nuclear enterprise in these countries, can be met under present conditions. The establishment of the Euratom Bureau Central de Mesures Nucléaires was therefore greatly welcomed by the members of EANDC, especially since its prime function is to concentrate on standardization problems of nuclear physics, chemistry and technology. EANDC expressed its great interest in the establishment of this centre and commented on specific areas of mutual concern. Such areas were found in:

- (a) Absolute neutron source calibrations;
- (b) Standardized flux determinations;
- (c) Absolute counting techniques;
- (d) Establishment of such primary cross sections as the U^{235} fission and the $B^{10} (n, \alpha)$ cross section;
- (e) Procurement and establishment of isotopic Pu samples.

Since many of the measurements made under EANDC cognizance rest upon absolute standards of one or more kinds and since often new techniques of standardization appear during experimental programmes, considerable beneficial interaction is expected between measuring groups and the standardization laboratories. Special awareness of this situation in EANDC should help, and has helped, optimize the mutual benefits.

6. Symposia

During the period under review, a symposium was suggested and sponsored by EANDC on the subject of "Neutron Time-of-Flight Methods", the purpose being to convene the foremost experts in this field for a highly detailed discussion of the "state-of-the-art" and its implications for the future. This meeting, held in Saclay from 24th to 27th July 1961, proved highly successful and the proceedings were most rapidly published.

7. Miscellaneous studies

EANDC occasionally concerns itself with studies of new proposals for programmes or experiments originating either within the Committee or submitted to it for advice. Two such studies were entertained during the subject period.

(1) The Scandinavian countries submitted a proposal to form a study group of experts from interested countries and organizations which would specify an experimental programme at Risø, the purpose of which would be the measurement of slow neutron spectra from D₂O-moderated natural uranium lattices. Although this programme was felt to be slightly out of the area of EANDC interest, encouragement and advice were expressed and the initial study group was formed.

(2) A proposal originating in the United Kingdom to study the possibilities of doing beam source experiments which might help establish generalizations of use to the optimization of neutron fluxes in magnitude or spectral region was submitted to EANDC. This proposal elicited a favourable response and resulted in a detailed sub-committee report on the subject.

8. Basic nuclear data

Probably the most important function of EANDC, as also of local data committees, is the assessment of the status of existing information on nuclear cross sections relative to needs of various using groups, and making recommendations for the orderly acquisition of additionally needed data. Three basic sets of input information are required to carry out this function: (a) a compilation of high priority requests for measurements representing the joint interest of all the organizations involved; (b) a comprehensive survey of critical cross-section discrepancies; and (c) documentation from individual countries and organizations supporting their interests.

Documents covering all these three categories of information have been produced for EANDC and progress reports are also being supplied by groups and countries to EANDC, which discuss the status of measurement programmes in the many laboratories involved.

EANDC has spent a great deal of time and effort in detailed discussions of substantially all of the first priority requests, examining the stated requirements for accuracy, resolution, etc., and considering what further steps should be taken. These discussions have been of great value not only in sharpening up the requirements, but also in giving each of the members insight into the problems in other organizations and in leading to advice as to desirable methods of solution.

9. General comments

The documents and compilations produced by and for the Committee have been and should continue to be of great help in evaluating the possibilities and limitations on work which might be performed in laboratories, both those directly and those not directly represented on EANDC. They should also assist in facilitating, as well as by drawing attention to the need for, equipment loans, exchange of personnel or the mutual use of equipment. There appears to be a general willingness to approach these problems, as well as for various laboratories to review their programmes in the light of EANDC discussions in a most helpful manner and one which should augur well for the successful attainment of the main aims of EANDC.

The formative period of EANDC appears to have been passed quickly and successfully, no doubt due to the close community of interest of the people involved.

No serious burden exists which might have arisen out of the disparate organizations represented, indeed the rapidity with which these organizations have reacted to suggestions from EANDC has been gratifying.

The depth of understanding of this group of the overall capability of the participating organizations to carry out a wise and efficient nuclear measurements programme is such that rapid progress may be expected in the future.

APPENDIX I

Members of the European-American Nuclear Data Committee
from its Formation to December 1961

- R.F. Taschek (Chairman)
Los Alamos Scientific Laboratory, U.S.A.
- C.H. Westcott (Executive Secretary)
Atomic Energy of Canada Limited, Canada
- R.Joly (Corresponding Secretary)
Centre d'Études Nucléaires, Saclay, France
- K.H. Beckurts
Karlsruhe, Germany
- A. Bracci
Ispra, Italy
- E. Bretscher
Atomic Energy Research Establishment, Harwell, U.K.
- H. Goldstein
Columbia University, U.S.A.
- J. Harvey
Oak Ridge National Laboratory, U.S.A.
- G.A. Kolstad
U.S. Atomic Energy Commission, U.S.A.
- L. Kowarski,
ENEA, Paris, France
- R. Meier
Würenlingen, Switzerland
- E.B. Paul
Atomic Energy Research Establishment, Harwell, U.K.
- N.G. Sjöstrand
AB Atomenergi, Sweden
- J. Spaepen
Bureau Central de Mesures Nucléaires, Euratom, Geel, Belgium
- J.S. Story
Atomic Energy Establishment, Winfrith, U.K.
- R.P. Perret (EANDC Central Secretariat)
ENEA, Paris, France

APPENDIX II

Terms of Reference of the European-American Nuclear Data Committee

Pursuant to the Agreement reached between the O.E.C.D. Member and Associate countries and the Euratom Commission at the meeting on 18th June 1959, of the Steering Committee of the O.E.C.D. European Nuclear Energy Agency (ENEA) and subject to ratification by the appropriate authorities in the United States and Canada, the O.E.C.D. Member and Associate countries will co-operate through the establishment of a "European-American Nuclear Data Committee" (hereinafter called "The Committee") in order to assure the maximum advancement of the peaceful uses of nuclear energy by means of full and effective collaboration in the measurement of nuclear properties of general importance.

I Scope

The Committee shall be concerned primarily with the measurements of nuclear cross-sections and other basic nuclear data of general relevance to nuclear energy programmes and the pre-commercial development of laboratory instruments and techniques related thereto. The responsibilities of the Committee shall include the following:

(1) Measurements: It shall critically review the existing state of knowledge of nuclear cross-sections and constants, identify those gaps in the knowledge which are of special significance to the nuclear energy programmes of the countries concerned and recommend the most expeditious methods for obtaining the required measurements.

(2) Equipment and Techniques: It shall review the facilities, techniques and manpower available for the determination of nuclear cross-sections and constants, consider present and future needs for techniques, equipment and facilities and recommend appropriate action.

(3) Research Materials: It shall keep informed of special materials available for research and facilitate the pooling and exchange of such samples as required.

(4) Equipment and Personnel Exchange: It shall consider and recommend pooling and exchange of equipment and personnel where appropriate.

(5) Nomenclature: It shall make continuing studies of the nomenclature used in this field and recommend methods for the presentation of nuclear cross-sections and constants.

(6) Compilation of Data: It shall receive reports from and comment on the activities of relevant compilation groups.

(7) Technical Meetings: It shall recommend the holding of and shall assist in the sponsorship of technical symposia to further the objectives of the Committee.

II Limitations

(1) It is recognized that some nuclear cross-section information may be primarily of military significance or otherwise subject to legal prohibitions against its dissemination and will not be exchanged.

(2) No member country or participating organization shall be obligated to take any action inconsistent with its bilateral agreements in effect with other countries and organizations.

III Representation

The Committee shall consist of fifteen members: four from the Euratom countries and the Euratom Commission, acting together, four from the United States, three from the United Kingdom, two from the other O.E.C.D. countries, acting together, one from Canada, and one from ENEA. Only technically-trained individuals with broad responsibilities for the direction of the relevant programmes in their respective countries or organizations shall be appointed. Appointments should be made in such a way that they provide continuity of membership, while allowing for such rotation as may be desired.

The executive function of the Committee shall be vested in the Chairman who shall be appointed for a two-year term by the appropriate authority of one country, or countries and organizations acting together. The order of rotation shall be (1) the United States, (2) Euratom countries and Commission acting together, (3) the United Kingdom, (4) Canada, (5) other O.E.C.D. countries and ENEA acting together, and shall begin with the United States.

Two Secretaries shall be appointed for a two-year term. The one, drawn from the same region (Europe or North America) as the Chairman, is designated the "Executive Secretary"; the other, drawn from the other region, is designated the "Corresponding Secretary". The Executive Secretary shall be chosen in consultation with the Chairman and the other Committee members from that region and appointed by the appropriate authority. The Corresponding Secretary shall be chosen in consultation with the Committee members from the other region and appointed by the appropriate authority. Both Secretaries shall normally be Committee Members.

IV Meetings

Intervals between meetings shall not exceed twelve months. Meetings normally shall be held successively in one of the five countries or groups of countries. The host country or group shall appoint a "Local Secretary" to assure appropriate arrangements for the meetings. A notice of the meeting and draft agenda shall be sent so as to be received by the members of the Committee at least thirty days in advance of the meeting.

Documents for meetings should normally be sent so as to be received by the members of the Committee at least two weeks before meetings.

Observers may be invited, in consultation with the Chairman, to attend the meetings of the Committee.

V Minutes, Reports and Committee File

Minutes of each meeting shall be prepared by the Executive Secretary and copies shall be sent by him to each of the members not later than thirty days after the close of each meeting. Amendments may be submitted within ninety days after the close of each meeting. Amended minutes shall be approved by the Committee at its next meeting, and then distributed by the Executive Secretary. The Committee shall issue such reports and recommendations as it may consider appropriate. A continuing official file of the Committee shall be kept by the Chairman, the Executive Secretary and Corresponding Secretary. One copy of all official Committee Correspondence shall be provided to the Executive Secretary and Corresponding Secretary for this purpose. Rules concerning the distribution of Committee documents shall be established by the Committee.

VI Amendments

Recommendations for amendments of the above terms of reference may be made by the Committee to the appropriate authorities. Such amendments will come into force following approval by such authorities.