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

This report briefly describes the activities of the EUROPEAN AMERICAN NUCLEAR DATA COMMITTEE over the period January 1962 to January 1964.

Three regular meetings were held during this period, the first at Casaccia and Ispra, Italy, from 5th to 10th April 1962, the second at Chalk River, Canada from 4th to 8th February 1963 and the third at Athens, Greece from 11th to 15th November 1963. A symposium on neutron flux measurements in the 1-100 keV region was held under EANDC auspices from 10th to 13th September 1963 at Oxford, England.

The Tripartite Nuclear Cross-Sections Committee was finally dissolved during 1963 and all its activities have now been handed over to the EANDC.

The following important facts pertaining to the principal fields of EANDC activity may be highlighted.

1. Nuclear Data

As in the previous period EANDC has devoted much time and effort to the problem of meeting requests for nuclear data measurements and the status of work in progress to satisfy these requests. Special attention has been paid to the philosophy underlying the requests and to ensuring that the accuracies required are substantiated. Reactor physicists and other requestors, stimulated by local data committees, have produced several valuable documents in this respect.

The priority definitions, according to which requests are grouped, have been revised. Lists of requests, covering the whole EANDC-area, have been issued for the three existing categories of priority.

Details of the measurement programmes are regularly described in regional progress reports. During the period under review this information was increased considerably in bulk, particularly from the Euratom and OR areas. Experiments are in progress to meet most of the requests for nuclear data measurements

with priority I. The number of facilities for measuring data, particularly those pertaining to the resonance and fast region, is increasing. The compilation of existing facilities (doc. EANDC 11), is being kept up to date and discussion of new and modified equipment has been made a standing agenda item for each committee meeting.

EANDC has recognised that difficult problems have to be faced to satisfy the requests for data on fissile isotopes in the resonance region. During this two year period the Committee has discussed many of these problems and has urged that special consideration be given to these data. It is particularly concerned about the state of capture cross-section and α-data, which presently fall far short of the requested accuracies.

EANDC has also discussed other specialised topics and as a result has made the following statements.

(a) There is now considerable confidence in the 2200 m/sec parameters of U^{235} and effort should now be concentrated on Pu^{239}.

(b) The $\bar{\nu}(E)$ values for U^{235} are now adequate for reactor needs. For other uranium isotopes and for Pu^{239} the data now available are almost sufficient but more effort is required on Pu^{240} and Pu^{241}.

(c) Probably enough data now exist to satisfy the requests for U^{238} (n,n) and U^{238} (n,n') up to 4 MeV incident energy.

2. Data Compilation

EANDC has been well aware of the fact that work in the data compilation and processing area especially as far as evaluation is concerned, is poorly coordinated and considerably less systematic than that in the measurement field. The Committee also clearly realised the necessity to improve the situation quickly if the full value is to be obtained from the experimental work.

EANDC therefore asked two study groups one for the North-American continent and one for Europe each composed of experts in the compilation field, to make recommendations on compilation services required and how these services could most

efficiently be provided. The groups exchanged information and arrived at the main conclusion, which was supported by EANDC, that two centres should be set up for the compilation of experimental data, one in USA and one in Europe. The centres should be closely linked, with frequent and complete sharing of the information received. Procedure for recording and reporting data should be common.

It was also recommended that a group participating actively and significantly in the preparation of "digested" data and operating as a public service, be established in the United States.

These recommendations were passed for consideration to ENEA, which then convened a group of experts to make a specific proposal concerning the European Compilation Centre. This proposal was agreed in November 1963 and the ENEA Neutron Data Compilation Centre has now been established at CEN, Saclay, France.

EANDC has also promoted compilation activity in specialised fields of interest to nuclear energy e.g. neutron induced threshold reactions.

3. Nuclear Standards

EANDC has been kept informed of the activities of Euratom's Central Bureau for Nuclear Measurements, Geel, Belgium, in the field of isotopic standards.

After this laboratory had thoroughly investigated the existing stocks of standard boron, laboratories in the EANDC-area have been advised to draw reference boron only from the stocks at CBNM, Geel, or NBS, Washington, both stocks being identical in composition. Depleted uranium and plutonium isotopic standards in the range of interest for burn-up studies are under preparation. The help of other laboratories for intercomparison of samples was ascertained through EANDC. A programme, in collaboration with Savannah River and Chalk River, to improve the situation for standardising heavy water has been started. Other laboratories expressed interest in the programme and will probably join it.

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

(a) Production of Special Isotopes

EANDC has been informed on the stocks of separated isotopes held in the USA and the UK and the methods of procurement of these isotopes. It has also been told of the irradiation and separation programme for the production of larger quantities of the plutonium isotopes presently in progress in the USA. It is anticipated that this stock will satisfy the most urgent needs for data measurements within the EANDC area. However, EANDC advised that further irradiations be made in order to meet continuing demands. It has now been informed that a further 3 kg of plutonium is being irradiated in the USA and that Canada has under consideration the irradiation of 2 kg.

At each meeting EANDC considers the sample requests of the various organisations from the technical point of view and makes appropriate recommendations for supply.

(b) Target and Sample Preparation

Because the supply of separated plutonium isotopes is limited, EANDC has formed a sub-committee to make recommendations on the fabrication of these samples for experimental use. Special attention is being paid to standardisation of sample dimensions in order to make them interchangeable between laboratories.

Resulting from EANDC action, experts on target and foil preparation from ORNL (USA), AERE (UK) and CBNM (Euratom) met for technical discussions at Geel. It became apparent that the laboratories operated in a complementary fashion; ORNL provides a routine service and did not assay whereas CBNM avoids routine production and concentrates on the manufacture and accurate assay of special foils. AERE operates between these two extremes. Arrangements have been made to keep the three groups in further contact.

5. Symposia

During the period under review a round-the-table discussion was sponsored by EANDC on the subject of neutron flux measurements in the 1-100 keV region. This meeting, organised by

AWRE, Aldermaston, was held in Oxford, 10th - 13th September, 1963 and proved very successful in formulating recommendations for measurements of standard cross-sections suitable for flux measurements. A watch-dog sub-committee has been formed to encourage action on these recommendations.

Two other conferences have been suggested by EANDC and their organisation has been started: one on "The Automatic Acquisition and Handling of Nuclear Data" (Karlsruhe, July 13th - 17th, 1964) and one on "The Study of Nuclear Structure with Neutrons" (Mol, July 12th - 16th, 1965).

6. Miscellaneous actions

(a) The original EANDC proposal to study the possibilities of doing beam source experiments resulted in the publication of six articles in a special issue called "Tailored neutron beams" of Reactor Science and Technology, Journal of Nuclear Energy, Parts A and B, July 1963.

(b) The needs, within the EANDC area, for beryllium single crystals have been canvassed and negotiations are in progress for the production of such crystals in Europe.

(c) EANDC has fostered the exchange of personnel which has led to a fruitful stay of several scientists in laboratories, outside their own country.

7. Relations with other organisations

(a) EANDC is kept informed on the activities of EACRP by its ENEA member. Some documents are exchanged and the others are available on request. Furthermore, in the future EANDC and EACRP will nominate an observer from their members to attend the other committee meeting.

(b) EANDC discussed the suggestions of IAEA in the field of nuclear data compilation and advised against a proposal for indexing put forward by a special IAEA panel. IAEA has also been kept informed of the EANDC recommendations about the steps to be taken in the compilation field. An IAEA observer has been admitted to limited parts of an EANDC-meeting.

EANDC also took note of the efforts of IAEA to establish a world wide data committee and the majority of its members participated in preliminary discussions of a working

group, set up in Vienna to try to establish such a committee. Such a worldwide committee would open up exchanges of nuclear information on an organised basis between the countries of the West and the East, and also including India, Japan and possibly others.

8. General Comments

It can now be stated that EANDC is running smoothly and is geared well to its overall task of promoting collaboration and exchange in the field of basic nuclear data. Due to its efforts experimental teams now have a clearer picture of the reactor programme requirements for data and it is apparent that a determined effort is being made to meet these obligations.

EANDC is also facing up to the growing problem of ensuring that data are compiled and evaluated in a coordinated way. If the expense and effort of measuring data are not to be wasted it will need to follow this aspect with vigour and enthusiasm. A good start has been made, however.

During this period many formal documents have been exchanged between the participating groups, partly with secretarial help from ENEA. These documents have proved to be very valuable to organisations active and interested in the data field. This willingness on the part of organisations and individual scientists to provide information to the Committee and to act on its suggestions is believed to be the main reason for the successful operation during the past two years.

APPENDIX I

Members of the European-American Nuclear Data Committee from January, 1962 to December, 1963

J. Spaepen (Chairman)
Bureau Central de Mesures Nucléaires, Euratom, Geel, Belgium

R. Batchelor (Executive Secretary)
Atomic Weapons Research Establishment, Aldermaston, U.K.

H. Goldstein (Corresponding Secretary)
Columbia University, U.S.A.

K.H. Beckurts
Karlsruhe, Germany

E. Bretscher
Atomic Energy Research Establishment, Harwell, U.K.

[1] G.C. Hanna
Atomic Energy of Canada Limited, Canada

W. Havens
Columbia University, U.S.A.

R. Joly
Centre d'Etudes Nucléaires, Saclay, France

O. Kofoed-Hansen
Risø, Denmark

G.A. Kolstad
U.S. Atomic Energy Commission, U.S.A.

M. Nève de Mévergnies
Mol, Belgium

[2] H.B. Smets
ENEA, Paris, France

J.S. Story
Atomic Energy Establishment, Winfrith, U.K.

R.F. Taschek
Los Alamos Scientific Laboratory, U.S.A.

[3] P. Weinzierl
Seibersdorf, Austria

1. Replaced C.H. Westcott, A.E.C.L., Canada - 1963
2. Replaced R.P. Perret, ENEA, Paris, France - 1963
3. Replaced R. Meier, E.I.R., Würenlingen, Switzerland - 1962

APPENDIX II

Documents Prepared for the European-American Nuclear Data Committee

1963-1964

Committee Papers

EANDC-17	"L"	Compilation of EANDC Priority I Requests (February 1962).
EANDC-18	"L"	Compilation of EANDC Priority II Requests (March 1962).
EANDC-19	"L"	Compilation of EANDC Priority III Requests (March 1962).
EANDC-20	"L"	Design Proposal for D_2O Lattice Spectrum Measurements at Risø (April 1962).
EANDC-21	"A"	Complete Minutes of the Fourth Meeting of the Committee - 5-6 April 1962, CNEN, Casaccia, Italy 9-10 April, 1962, Euratom, Ispra, Italy (August 1962).
EANDC-21	(T)"U"	Technical Minutes of the Fourth Meeting of the Committee - 5th and 6th April 1962, CNEC, Casaccia, Italy - 9th and 10th April 1962 Euratom, Ispra, Italy (August 1962).
EANDC-22	"L"	Study of Cold Neutron Sources (August 1962).
EANDC-23	"L"	First Biennial Report of the Activities of EANDC (February 1963).
EANDC-24	Spec. Distr.	Compilation of Nuclear Data for Reactor Calculations, First Report of the EANDC European Compilations Study Group (December 1962)
EANDC-25	"L"	Compilation of EANDC Priority I Requests (January 1963).
EANDC-26	"L"	Compilation of EANDC Priority II Requests (January 1963).
EANDC-27	"L"	Compilation of EANDC Priority III Requests (January 1963).

EANDC-28 "A" Complete Minutes of the Fifth Meeting of the Committee, 4-8 February, 1963, AECL, Chalk River, Canada (May 1963).

EANDC-28 "L" Technical Minutes of the Fifth Meeting of the Committee - 4th-8th February 1963, A.E.C.L. Chalk River, Canada (July 1963).

EANDC-29 "U" Distribution of Committee Documents (May 1963).

EANDC-30 "A" List of Members (June 1963).

EANDC-31 "A" Cumulative List of EANDC Documents (June 1963).

EANDC-32 Spec. Distr. Minutes of the Second Meeting of the EANDC Compilations Study Group. Brussels on 9th-13th September, 1963 (October 1963).

EANDC-33 "U" Symposium on the Absolute Determination of Neutron Flux in the Energy Range 1-100 keV at St. John's College, Oxford, U.K. (September 1963).

EANDC-34 "A" Sample Requests (October 1963).

EANDC-35 "A" Complete Minutes of the Sixth Meeting of the Committee, 11th-15th November, 1963, Atomic Energy Centre Democritus, Athens, Greece.

EANDC-35 "L" Technical Minutes of the Sixth Meeting of the Committee, 11th-15th November 1963, Athens, Greece.

EANDC-37 "L" $\bar{\nu}$ - Measurements; Present Status and Recommendations for Future Experiments.

Canada

EANDC(Can)-12"L" The Scattering Law for Light and Heavy Water at 20°C and 150°C (March 1962).

EANDC(Can)-13"L" Canadian Progress Report for European-American Nuclear Data Committee (March 1962)

EANDC(Can)-14 "L" Canadian List of Requests for Measurement: "Background" Report (November 1962).

EANDC(Can)-15 "L" Notes on the Thermal Neutron Data for U^{235} and Pu^{239} November 1962).

EANDC(Can)-16 "L" Canadian Progress Report to the EANDC (April 1962 to January 1963 inclusive) (January 1963).

EANDC(Can)-17 "L" Canadian Progress Report to the EANDC (January 1963 to September 1963 inclusive) (October 1963).

EANDC(Can)-18 "L" Canadian List of Requests for Measurement (October 1963).

EANDC(Can)-19 "L" Fission Resonance Integrals of U^{233}, U^{235}, Pu^{239} and Pu^{241} (October 1963).

EANDC(Can)-20 "L" The Capture and Fission Resonance Integrals of U^{235} (October 1963).

Euratom

EANDC(E)-28 "L" Compilation of Cross-sections for some Neutron Induced Threshold Reactions (November 1961).

EANDC(E)-29 "L" Compilation of Requests for Nuclear Cross-Section Measurements from Euratom Countries (March 1962).

EANDC(E)-30 "L" Need of Be Single Crystals for Neutron Spectrometry (March 1962).

EANDC(E)-31 "L" Euratom Requests for Samples (March 1962).

EANDC(E)-32 "L" Amendments to Euratom Request List EANDC(E)- 29 for Nuclear Cross-Section Measurements (March 1962).

EANDC(E)-33 "A" Program for Establishment of Uranium and Plutonium Isotopic Standards in the Euratom Community (March 1962).

EANDC(E)-34 "A" Separation of a 1.4 g - Quantity of Plutonium Isotopes (March 1962).

EANDC(E)-35 "U" Neutron Cross-section for Fast Reactor Materials, Part II: Tables, (December 1962).

EANDC(E)-36 "L" The Isotopic Composition of Samples, Originating from Different Stocks of Boron Standard, Used in Laboratories of the EANDC-Area as Bases for Neutron Measurements (August 1962).

EANDC(E)-37 "L" Background for the Combined German-French Priority I Request for $\sigma_{nf}(Pu^{240})$ Measurements (July 1962).

EANDC(E)-38 "L" Progress Report on Nuclear Data Research in the Euratom Community (December 1962).

EANDC(E)-39 "L" Thermal Activation Cross-sections and Resonance Integrals of In^{115} (1962).

EANDC(E)-40 "L" Status Report on Cross-section Measurements in the Euratom Community on the Fissionable Nuclei (December 1962).

EANDC(E)-41 "A" Measurements, planned in the Euratom Community on Fissile Nuclei, for which no Samples are presently available in the Community and Lists of Samples needed (January 1963).

EANDC(E)-42 "U" Analysis of the Resonance Integral of Zirconium (January 1963).

EANDC(E)-43 "L" Compilation of Requests for Nuclear Cross Section Measurements from Euratom Countries (January 1963).

EANDC(E)-44 "L" Comments on Study of the Sensitivity of Fast Reactor Calculations to Uncertainties in Nuclear Data (January 1963).

EANDC(E)-45 "L" Reactivity Effects Due to Variations in Nuclear Parameters in a Thermal Power Reactor (1963).

EANDC(E)-46 "L" Influence of Nuclear Data Uncertainties on the theoretical Prediction of Doppler Coefficients in fast and intermediate Reactors (1963).

EANDC(E)-47 "L" Compilation of Requests for Nuclear Cross-Section Measurements from Euratom Countries (July 1963).

EANDC(E)-48 "A" Minutes of a Meeting on Isotope Supply and Sample Preparation (August 1963).

EANDC(E)-49 "L" Progress Report on Nuclear Data Research in the Euratom Community (October 1963).

EANDC(E)-50 "L" Status Report on Cross-Section Measurements of Neutron induced Threshold Reactions (May 1964).

Other O.E.C.D. Countries and ENEA

EANDC(OR)-18 "L" Progress in Nuclear Data Measurements in Sweden.

EANDC(OR)-19 "L" Collected Progress Reports to EANDC from Austria, Greece, Sweden and Switzerland (January 1963).

EANDC(OR)-20 "U" Inherent Uncertainties in Calculated Uranium Resonance Integrals (February 1963).

EANDC(OR)-21 "U" Slow Neutrons Cross Sections for He^3, B and Au (July 1963).

EANDC(OR)-22 "U" Progress Report to EANDC from Danish AEC Research Establishment Risø for the Period until September 1963 (September 1963).

EANDC(OR)-23 "L" Progress Report to EANDC from Sweden (August 1963).

EANDC(OR)-24 "L" The Use of Electromagnetic Mass-Separation for Cross Section Measurements in Continental Europe (1963).

EANDC(OR)-25 "L" Progress in Nuclear Data Activities in Austria since Autumn 1962 (September 1963).

EANDC(OR)-26 "U" Investigations on the Effect of a Split Reactor-Core on the Purity of Thermal Neutron Beams.

EANDC(OR)-27 "A" Messung der F^{18} Aktivierung im Kern eines wassergekühlten Reaktors (January 1962).

EANDC(OR)-28 "A" Progress Report to EANDC from Norway (October 1963).

EANDC(OR)-29 "L" Progress Report to EANDC from Switzerland (November 1963).

EANDC(OR)-31 "L" Measurements of Prompt $\bar{\nu}$ in fast Neutron fission of U^{238} induced by Neutrons from 1.5 to 15 MeV (April 1964).

United Kingdom

EANDC(UK)-13 "L" Current Nuclear Data Requirements for the Reactor Programme in the United Kingdom (March 1962).

EANDC(UK)-14 "U" Thermal Cross-Section and Resonance Absorption Integral of Pu^{240} (March 1962).

EANDC(UK)-15 "U" Progress Reports to the U.K. Nuclear Reactor Data Committee A.E.R.E. Harwell (January 1962).

EANDC(UK)-16 "L" Nuclear Data for Thermal Reactors (February 1962).

EANDC(UK)-17 "L" Derivation of the Nuclear Cross-Section Requirements for Fast Reactor Calculations (March 1962).

EANDC(UK)-18 "L" Fast Neutron Interactions with U^{238} (1962).

EANDC(UK)-19 "L" Standard Cross-Section for Neutron Flux Measurements between 10 keV and 100 keV (1962).

EANDC(UK)-20"L" Current Nuclear Data Requirements for the Reactor Programme in the United Kingdom (December 1962).

EANDC(UK)-21 "U" Progress Reports to the U.K. Nuclear Reactor Data Committee A.E.R.E. Harwell - (January 1963).

EANDC(UK)-22 "L" Intercomparison of Foils of Fissile Nuclides (1963).

EANDC(UK)-23 "U" Resonance Parameters of the Neutron Cross-Section of U^{238} (October 1962).

EANDC(UK)-24 "L" Mass Spectrometer and Isotope Separator Facilities at AWRE (1963).

EANDC(UK)-25 "L" Mass Spectrometer and Isotope Separator Facilities at A.E.R.E. (October 1963).

EANDC(UK)-26 "U" A Review of Evaluations of Neutron Cross-sections available at September, 1963 (September 1963).

EANDC(UK)-27 "U" The Ratio of Thermal Neutron Capture to Fission for ^{239}Pu (1962).

EANDC(UK)-28 "U" Progress Reports to the U.K. Nuclear Reactor Data Committee A.E.R.E. Harwell (October, 1963).

EANDC(UK)-29 A") Proposed International Punched Card/ Magnetic Tape Format for Evaluated Nuclear Cross-section Data (October 1963).

EANDC(UK)-30 "U" The Accurate Measurement of $\bar{\nu}$ by the Boron Pile (1963).

EANDC(UK)-31 "A" Provision of Separated Isotopes for Nuclear Data Measurements of Interest for Reactor Calculations (November 1963).

EANDC(UK)-33 "A" The Role of the E.A.N.D.C. in Evaluation (1964).

EANDC(UK)-37 "L" TheAverage Neutron Total Cross-Section of U^{235} from 0.1 to 70 keV (December 1963).

United States

EANDC(US)-25 "U" Compilation of Reduced Slow Neutron Partial Differential Scattering Cross-Sections (July 1962).

EANDC(US)-26 "U" Least Squares Analysis of the 2200 m/sec Parameters of U^{233}, U^{235} and Pu^{239} (June 1962).

EANDC(US)-27 "U" Reports to the AEC Nuclear Cross-Sections Advisory Group - Brookhaven National Laboratory- May 14-15, 1962 (September 1962).

EANDC(US)-28 "L" Status Report on Cross-Section Measurements in North America of the Fissionable Nuclei (September 1962).

EANDC(US)-29 Stable Isotope Inventory (1963).

EANDC(US)-30 "U"	Compilation of Requests for Nuclear Cross-Section Measurements (September 1962).
EANDC(US)-31 "U"	Reports to the AEC Nuclear Cross-Sections Advisory Group - Lawrence Radiation Laboratory, October 15-16, 1962 (March 1963).
EANDC(US)-32 "U"	Target Preparation Program (January 1963).
EANDC(US)-33 "A"	Some Recent Cross-Section Work from Non-EANDC Nations (January 1963).
EANDC(US)-34 Spec. Distr.	A Survey of the Present Status and Possible Future of Neutron Cross-Section Compilations in the United States and Canada (January 1963).
EANDC(US)-35 "U"	Research Trends: Nuclear Structure Physics 1962-1967 (October 1962).
EANDC(US)-36 "U"	Fission Cross Section of U^{235} (January 1963).
EANDC(US)-36 "A"	ORNL Plutonium Inventory as of 7/31/62 (1962).
EANDC(US)-37 "U"	Conference on the Utilization of Multiparameter Analysers in Nuclear Physics (1963), held at Grossinger, N.Y. - November 12-15, 1962.
EANDC(US)-38 "U"	Reports to the AEC Nuclear Cross-Sections Advisory Group. Rice University (February 25, 1963).
EANDC(US)-39 "U"	Angular Distributions in Neutron Induced Reactions, Volume 1, Z = 1 to 22, Volume II, Z = 23 to 94, (October 1962).
EANDC(US)-40 "L"	Stable Isotope Cross-Section Research Pool Inventory (July 1, 1963).
EANDC(US)-41 "U"	Reports to the AEC Nuclear Cross-Sections Advisory Group, Meeting at University of Colorado. (August 13-14, 1963).
EANDC(US)-42 "U"	Compilation of Requests for Nuclear Cross-Section Measurements (1963).
EANDC(US)-43 "A"	ORNL Plutonium Inventory as of June 30, 1963 (December 1963).

EANDC(US)-44 "L"	Status of Measurements of the Total Cross-Section of Pa-233 (October 1963).
EANDC(US)-45 "U"	Off-Site Nuclear Cross-Sections Measurement Program (October 1963).
EANDC(US)-46 "U"	U.S. Facilities for Making Low Energy Neutron Cross-Section Measurements (October 1963).
EANDC(US)-47 "A"	Informal Notes on Use of On-Line Computers in Physics Research in U.S.A. (November 1963).
EANDC(US)-48 "A"	Neutron Cross-Section Measurements for Nuclear Structure and Nuclear Energy (November 1963).
EANDC(US)-49 "A"	Fast Neutron Cross-Section Requirements for Nuclear Energy Applications (November 1963).
EANDC(US)-50 "U"	Reports to the A.E.C. Nuclear Cross-Sections Advisory Group (January 1964).
EANDC(US)-51 "U"	Neutron Cross Section Evaluation Group (August 1963).
EANDC(US)-52 "A"	Normalization of the Epithermal U^{235} Fission Cross-Section (January 1964).