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EUROPEAN
AMERICAN
COMMITTEE ON
REACTOR PHYSICS

FIRST BIENNIAL REPORT OF THE ACTIVITIES OF THE EUROPEAN AMERICAN COMMITTEE ON REACTOR PHYSICS

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First Biennial Report on the Activities of EACRP

B. I. Spinrad and R. W. Meier

This report summarizes the activities of the European-American Committee on Reactor Physics (EACRP) over the two year period between its formation early in 1962 and the end of 1963. The report also includes comments on the status and accomplishments of the Committee by the end of that period.

1. Formation

The EACRP is a sister committee to the European-American Nuclear Data Committee (EANDC) which was formed in 1959. Although the incentive for forming EANDC included a desire to improve the status of all nuclear physics data pertinent to reactors, it soon became clear that EANDC could be most useful if it focused its attention on basic differential nuclear and neutron cross-section data. Information of an integral nature, largely available from reactor physics measurements, was therefore excluded, with the exception of some borderline cases.

The desirability of similar co-operation in matters of integral data and related reactor physics topics, was of course recognized by EANDC; and it attempted to deal with such questions through a subcommittee. However, the wide scope of the subject made it logical that a separate Committee be formed to deal with reactor physics; and EANDC so recommended in November, 1960.

The Steering Committee of the O.E.C.D. European Nuclear Energy Agency (ENEA) favoured this suggestion, and convened a group of reactor physics experts representing the twenty member and associated member countries of ENEA, Euratom and the International Atomic Energy Agency. This group met at Winfrith on 7th and 8th February 1962, under the chairmanship of Mr. T. M. Fry of the United Kingdom Atomic Energy Authority. It endorsed the formation of the suggested European American Committee on Reactor Physics and recommended Terms of Reference

for it. The ENEA Steering Committee approved the Terms of Reference in April 1962. These are reproduced as Appendix A.

2. Function of the Committee

As defined in the Committee's Terms of Reference, its main task is "to review the existing state of knowledge in selected areas of reactor physics of general interest to the nuclear energy programme of the countries concerned; to identify discrepancies and gaps in this knowledge and to promote the initiation and co-ordination of programmes of research to fill these gaps".

EACRP is also expected to take note of requests for nuclear data measurements and to keep the principles of priority assignment under review. In this function, it must of course interact strongly with EANDC. It is required to encourage dissemination of information relating to reactor physics, and to consider nomenclature and conventions used in presenting data. The Committee also is intended to collect and disseminate information on the facilities, techniques, and special materials available to facilitate assistance and co-ordination in their development and to promote movements and exchange of personnel.

3. Organization

3.1 Membership

The Committee consists of fourteen members, all of whom are reactor physics experts. The distribution of membership among countries, laboratories, and other organizations is adjusted so as to maintain a suitable geographical balance, while including representation from laboratories and countries which are the most active in the field. Corresponding members are appointed for countries not directly represented on the Committee; they receive all Committee documents and are kept in close touch by letter with the work of the Committee. The Committee may also use the services of Consultants from any of the member countries.

Appendix B lists the Committee Members and Corresponding Members.

3.2 Meetings

In 1962 and 1963 EACRP held three regular meetings: at Saclay from 25th to 27th June 1962; at Zurich from 11th to 14th February 1963; and at Idaho Falls from 11th to 14th October 1963. The schedule of three meetings per biennium has proved useful and feasible.

3.3 Officers

The Committee has a Chairman and a Secretary, elected from the membership. The term of office is two calendar years. The authors of this report were elected Chairman and Secretary, respectively, at the Saclay meeting, and served until the end of the calendar year 1963. At the Idaho Falls meeting, Mr. Peter Mummery was elected Chairman, and Mr. Eugene Critoph Secretary, for the period 1964-1965.

The ENEA Secretariat provides additional secretarial services, maintains a central record, facilitates liaison with other Agencies, and performs most of the documentation work of the Committee. Dr. Henri B. Smets of ENEA has been in charge of this activity.

4. EACRP's Activities and Accomplishments

One of the main functions of the Committee is to keep itself informed on all relevant activities in its member countries. As a result a review of the reactor physics activities and national programmes is a standing agenda item of all regular EACRP meetings.

Due to the large scope of the field of reactor physics and the high degree of specialization in it, the Committee has had to limit the topics to be dealt with by a reasonable choice of the most important areas. It has set up a criteria for choosing particular agenda items that a number of countries should be active and that research in these areas is likely to continue for several years.

The topics discussed below are those for which either some Committee action has been taken, or concerning which a Committee consensus has been reached. When such consensus exists, publication thereof is quite often in itself a sufficient action.

4.1 Heavy Water Lattice Physics

Methods of calculation for D_2O moderated lattices are widely based on the four factor formula - two group model. As a result they have tended to be recipe calculations based on this symbolism. Whereas this treatment has the advantage of mathematical simplicity it suffers from the fact that the physical foundation is frequently not sound enough to make it useful over large ranges of parameters. The need for various tests against experiments was therefore strongly emphasized by the Committee. A compilation of available data on D_2O lattice measurements was undertaken as a first step. Information is compiled on standardized data sheets and communicated by a fast distribution system to all interested organizations and individuals through the ENEA Secretariat.

Several laboratories have described the basis of their methods they are using at present and have provided the Committee with extensive comparisons between their calculations and lattice measurements. Further, a number of schemes for the treatment of fundamentally better models have been presented and satisfactory progress can be reported. At the present time inaccuracies in nuclear data and in calculations are closely correlated. Improvements in the calculations will probably require corresponding improvements in the input data. Since perfection in the knowledge of nuclear data as well as in development of rigorous calculation methods has not been reached, the Committee considered those measurable integral parameters which are required to specify heavy water lattice performance, both from the point of view of progress in reactor physics and in the light of

power reactor performance requirements. A number of major integral parameters were identified which should enable the requirements to be met. Whereas some of the measurements can be confined to simple geometrical configurations it appears that for some time to come the validity of various power reactor designs will require verification in specific mock-up experiments.

The opinions and conclusions of the Committee on the subject of heavy-water reactor physics were summarized in a paper, which was presented at the I.A.E.A. Panel on Heavy Water Lattices, held from 18th to 22nd February 1963 in Vienna. This presentation helped in bringing the Panel discussions into focus on the most significant topics.

4.2 Substitution Technique for Lattice Evaluation

The lattice substitution method is a widely used technique for the measurement of lattice bucklings, when the amount of fuel available is limited. It has been used in critical as well as in exponential systems. EACRP has considered extensively the merits and limitations of existing methods of analysis. Both the one group perturbation and the two group-two zone models satisfactorily explain the phenomena for lattices in which the diffusion parameters are well matched. The Committee was particularly concerned about the more unfavourable cases of mismatched systems. There the effect of the substitution is to create an intermediate zone in which important reactions occur in a non-equilibrium spectrum. More sophisticated methods of interpretation and eventually a full heterogeneous treatment of the lattices will be needed.

A review article*on the subject of the substitution method has been written by one of the Committee members.

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* Naudet, R.: "Examen Critique des Méthodes de Substitution" EACRP-L-32 (Oct. 1963).

4.3 Neutron Spectra in Thermal Reactors

EACRP has considered the fact that, in principle, local spectra can be computed from cross section and scattering law data. However, scattering law data currently available are not sufficiently comprehensive, nor well enough checked, to suffice in themselves. Therefore, spectrum measurements should be used for two purposes: to correlate spectra empirically and to provide confidence in our use of spectra whose form is suggested or specified from basic calculations. The first objective is best served by using the spectrum-sensitive foil technique in reactor lattices. The Committee considers that development of new foil materials with low energy activation resonance or markedly non-1/v activation would be of value. The second objective can be met by accurate differential spectrum measurements in simple, interpretable systems. Such experiments have been performed with time of flight techniques in pure and poisoned moderators * and continuation of work in particular using interesting absorbers is encouraged.

The direct measurement of spectra inside fuel elements poses severe experimental difficulties. Successful measurements inside fuel tubes have been reported ** , however; the Committee has also examined possibilities of getting relevant information in other ways.

4.4 Burn-up Physics of Thermal Reactors

The goal of burn-up physics studies is the attainment of calculation prescriptions which are known to predict accurately the long term behaviour of reactors. EACRP has considered two aspects of the burn-up problem:

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* Poole, M.J. et al : "Some Measurements of Thermal Neutron Spectra" in Experimental and Critical Experiments, Vol.3, pp. 87, IAEA, Vienna, 1964.
Beyster, J.R. et al : "Measurements of Neutron Spectra in Water Polyethylene and Zirconium Hydride", Nucl. Sci. Eng. 9, 168 (1961).

** Johansson, E. et al : "The Neutron Spectrum in a Uranium Tube" EACRP-L-38 (1965) (Other work in progress).

i. Calculation of Effects from First Principles

Although cross-section data in the thermal neutron range are adequate for clear criticality predictions in most cases, the high sensitivity of reactivity change with burn-up to the small residual errors makes the precision still inadequate for this application. Further improvement of the absorption and fission cross-sections will be needed. Similarly, the neutron spectrum in a reactor becomes extremely important for long burn-up reactivity and reactivity co-efficient calculations. The precision to which the spectrum can be predicted in turn depends largely on our knowledge of the scattering law in the moderator. Consequently, the Committee encourages attempts to improve scattering law information, particularly at room temperature and near the cross section peaks of Pu^{239} and Pu^{240} around 0.3 eV and 1.0 eV respectively.

ii. Usefulness of Integral Experiments and Irradiations

A co-ordinated programme of various types of integral experiments has been discussed by the Committee. As a first step the significance of irradiations of fuel samples under well defined neutronic conditions followed by a careful analysis of the local isotopic composition have been stressed. As a next step, critical experiments built up of two types of fuel become meaningful: first, synthetic fuel experiments, duplicating conditions of burn-up at some specific time in a reactor cycle; and second, irradiated fuel experiments with fuel elements previously irradiated in operating reactors. Finally, consideration has been given to translating integral information obtained in experiments at one reactor to predict performance of another reactor of the same class. In addition to pure reactivity parameters the interest would be in obtaining various reactivity coefficients.

4.5 Nuclear Data Requests

One of the objectives of EACRP is to take note of requests for nuclear data measurements forwarded to EANDC and to keep

under review the principles on which priorities are assigned. A particular objective of this activity is to outline the general principles that should govern the accuracy requirements of nuclear data requests. The economic penalty resulting from nuclear data uncertainties has often been considered as the only possible basis for the justification of costly experiments. However, in applying this basis one soon is faced with great difficulties since the results depend not only on the type of reactor but also on special design features and the role of integral experiments in the design philosophy. EACRP has suggested new procedures in which the tolerable error for different reactor properties is evaluated, taking into account;

- errors other than nuclear data (theory, inaccuracies in mechanical fabrication and material composition, fluctuations from hydrodynamics),
- improvements obtainable from the experience with the first reactor of one type for later reactors of the same class,
- accuracy of nuclear data achievable with reasonable effort by means of present techniques,
- possible normalization by integral experiments.

This subject is under continuous study.

4.6 Nuclear Data Compilation and Evaluation

A widespread and increasing application of electronic computers to reactor physics has occurred during the past few years. For more elaborate calculations to be meaningful it is necessary to have detailed and reliable nuclear data available. Whereas extensive and well co-ordinated efforts, initiated by EANDC and the various countries, are under way in nuclear data measurements and reporting, there remain large problems in their interpretation and in the preparation of derived quantities for reactor calculations. EACRP,

representing the users of nuclear data, is concerned with the reduction and interested in the evaluation of these data. EACRP Sub-committees have been set up to work out the reactor physics compilation and evaluation needs, to keep contact with and give advice to the EANDC Compilation Study Groups, and, generally, to represent reactor physics interest in these matters.

4.7 Computers and Codes

The dominant role of computers in reactor physics calculations has led EACRP to consider their development and advanced uses at regular intervals. It recommended further development and use of universal programming languages, and increased contact between computer centres in the field of code exchanges. It supported ENEA's idea of setting up a Computer Programme Library in Europe as a counterpart to the United States Argonne Code Centre.

EACRP also considered the computational needs of laboratories which do not have direct access to the largest-scale computing equipment. It recommended that such laboratories establish closer contact with major computer centers, and that, in view of the diversity of the smaller machines, a greater effort be made to write the appropriate codes for them in a form suitable for translation.

4.8 Foil and Detector Standardization

Reactor physics measurements programmes need activation detectors of materials with appropriate cross section behaviour in the thermal, epithermal and fast energy regions. Much effort is spent by individual laboratories in fabricating foils or wires for particular applications. EACRP is attempting to co-ordinate activities and to improve the utilization of the facilities in the various laboratories. Both EACRP and EANDC are active in publishing the existence of the stable isotope pools and other experimental materials in the United States and the United Kingdom, and in co-ordinating the contacts between potential users of these materials and their custodians.

Important to the use of these materials is their analysis and fabrication into specified shapes. EACRP has initiated a survey for materials most widely requested for reactor physics purposes; has suggested that corresponding stocks of carefully analysed materials be acquired; and is surveying the availability of fabrication competence.

4.9 Critical Experiment Fuel Elements

EACRP has noted with approval the various exchanges of critical experiment fuel elements which have taken place. To facilitate further exchange, it has recommended that the Secretariat set up a catalogue of existing fuel elements for critical and subcritical reactor experiments at the various laboratories. It is expected that this information will stimulate inter-laboratory planning of experimental progress, prevent some duplication of fabrication effort, and permit laboratories to undertake useful experiments which may not otherwise have been planned because of the cost or scheduling of fabrication.

While keeping cognizant of such exchanges, and offering good offices where necessary, EACRP has recognized that the actual implementation of the exchanges must be within the framework of bi- and multilateral national agreements.

4.10 Other Technical Matters

In addition to those subjects of a continuing nature which have already been mentioned, EACRP has currently under discussion three specific technical matters:

1. The procurement of useful reactor physics data from the operation of power and research reactors.
2. A survey of the experimental techniques used in or recommended for reactor physics.
3. Consideration of Doppler effect.

These are recent topics which have not yet produced an action or consensus.

4.11 Topics not yet covered

The Terms of Reference indicated that EACRP should function within the field of neutron shielding. This subject has not yet been explored. Committee members active in the field of shielding will take the lead in proposing pertinent topics for the agenda.

Similarly, EACRP has been asked to consider standardization of notation. It has appeared to the Committee that major attention needs to be given only to standardization of input data to reactor programmes on large computers, and it is this aspect of the format of reactor physics which is currently receiving Committee consideration.

Finally, EACRP has taken no formal action in the matter of exchanges of personnel and equipment. Such exchanges seem to be active as a result of individual initiative and various bilateral arrangement. The Committee has reasonable cognizance of these activities by virtue of the breadth of contact of its membership, but no formal consideration has seemed necessary as yet.

4.12 Relations with Other Committees and Organizations

The legitimate interests of the EACRP overlap those of EANDC on matters of neutron cross-section measurement priorities and the evaluation of cross-section data. In order to maintain liaison, EACRP has arranged to exchange minutes and other documents with EANDC and exchange observers at meetings when appropriate; as already mentioned, two liaison sub-committees (one on each side of the Atlantic) have also been commissioned.

There is a similar overlap of interests and indeed, a three way one, since EANDC is also associated to the activities of the ENEA Computer Programme Library and the ENEA Neutron Data Compilation Centre, in the fields of reactor code exchange and computer storage of cross section information and of reactor integral data. As the Centre becomes

operational, a formal liaison will be required.

At two of EACRP's three meetings, observers from I.A.E.A. have been present. I.A.E.A. has requested that this practice continue, since EACRP appears to be able to reach a useful focus on matters of interest to the Agency. On our part, we have been happy to have such observers, provided only that they are experts who contribute to our meetings technical information of interest to us, originating from outside our geographical area.

5. General Comments by the Authors

Regional co-operation in the field of reactor physics has existed essentially since the first Geneva Conference in 1955. However, a formal body to give expert advice on an international scale was lacking. It was one of the main aims in forming EACRP to fill this gap. Hesitations have been expressed that matters of national and commercial character might be touched. The experience obtained over the period of this review has proved that collaboration in many areas of the vast field of reactor physics can expedite progress in matters of mutual interest.

One reason for the success of this co-operation is the heavy reliance of EACRP on technical consensus as the primary result of deliberations. The questions brought before the Committee are primarily within the framework of science, rather than of policy; and such matters can be discussed and resolved with virtual unanimity. The result of this may be a scientific paper, or a monograph, and knowledge of EACRP endorsement is spread in the free fashion of the technical world, rather than by formal action.

A second kind of action, which is rarely controversial, concerns the dissemination and organization of technical information. The Committee has taken the position that this type of activity is best done when a single laboratory takes the initiative; and whenever possible, EACRP fosters multilateral use of existing facilities for such work.

Only when an activity is exclusively data collection and dissemination (as in the case of heavy water lattice data collection, multilateral listing of foil material requirements, or multilateral listing of critical experiment fuel) does the Committee initiate operations through the ENEA Secretariat. In other cases (foil standardization, multigroup cross-section storage) it encourages or endorses the formation of centres at appropriate laboratories.

We are proud of the relative openness of its deliberations. Approximately 85% of its meetings may ethically be opened to accredited observers; the closed sessions are mostly concerned with internal Committee business. The large number of documents which have been produced by or for the Committee are primarily open circulation, either completely unlimited (U) or limited (L) to professional distribution to achieve better use from a limited number of copies. These documents have been of great value in helping the various laboratories keep abreast of each other's work, and thus in guiding the setting up of reactor physics programmes.

The authors have two further recommendations for the future. First, on the matter of future agenda, we feel that the following two topics should be considered:

a) Physics of fast reactors. There are now many laboratories in the various countries with active programmes in this large field.

b) Physics of reactor safety. This is another field in which there is widespread activity. A committee of experts, such as EACRP, can play a useful advisory role, with the aim of keeping safety research free from the opposite errors of ignoring important phenomena or considering problems which do not really affect safety.

Second, on the question of Committee membership, we would suggest that the various countries periodically review

their representation according to the changing interests of the Committee and of the individuals concerned.

6. Acknowledgments

The work of the Committee would probably have not been so successful without a number of personal contributions to be acknowledged. First, the Secretariat personnel supplied to EACRP by ENEA have provided excellent services in organizing, recording, and expediting the Committee's work.

Second, the services provided to the Committee by the laboratories represented on it have been very useful; and particularly, those provided by the laboratories which have been hosts at meetings have played an essential role.

Finally, the regularity of the meetings and the continuity of personnel has helped to stimulate a useful group spirit, typified by mutual trust, and resulting in discussions which may be strong and frank, but not bitter.

APPENDIX A

EUROPEAN-AMERICAN COMMITTEE ON REACTOR PHYSICS

I. SCOPE

The European-American Committee on Reactor Physics (hereinafter called the "Committee") shall essentially be concerned with the neutronic aspects of reactor physics which are of general and mutual relevance to nuclear energy programmes.

Questions relating to the space, time and energy distribution of neutrons and radiations in different media fall within the scope of the Committee, but the determination of nuclear cross sections and the thermo-dynamic and hydro-dynamic properties of the media remain outside its scope.

II. TERMS OF REFERENCE

The Committee's initial terms of reference should be as follows:

(1) Review

The Committee should review the existing state of knowledge in selected areas of reactor physics of general interest to the nuclear energy programmes of the countries concerned, identify discrepancies and gaps in this knowledge and promote the initiation and co-ordination of programmes of research to fill the gaps.

(2) Nuclear data

The Committee should take note of the national requests for the new determination of nuclear cross sections and other basic parameters which have been forwarded to the European-American Nuclear Data Committee (EANDC) and keep under review the principles on which priorities are to be assigned to these requests; it may also comment on the assignment of priorities to individual requests.

(3) Nomenclature and conventions

The Committee should review the definitions, methods and nomenclature used in presenting data relating to reactor physics, and recommend standard conventions in this field.

(4) Dissemination of information

The Committee should encourage the preparation, exchange and publication of reports, monographs and computer codes within its scope.

Whenever necessary, the Committee should recommend the holding, or assist in the sponsorship, of scientific symposia to further its objectives.

(5) Equipment and techniques

The Committee should advise on and facilitate the exchange of information on the facilities, techniques and equipment available for studies within its scope and should promote mutual assistance and co-ordination in their development and supply.

(6) Special materials for experiments

The Committee should advise on and facilitate the exchange of information on the standard samples, the fuel elements and other special materials that may become available for experiments and should, where appropriate, facilitate the pooling, exchange and loan of such materials.

(7) Personnel

The Committee should encourage movements and exchanges of personnel to make better use of staff and facilities and to provide mutual assistance.

III. LIMITATIONS

The Committee shall be advisory to its participating countries and organisations. It will not be empowered to allocate tasks by authorative or majority decision, but must further its objectives by seeking the free consent of the parties concerned.

It is recognized that some information relating to reactor physics may be primarily of military significance or otherwise subject to national prohibitions against its dissemination and will not be exchanged.

No participating country or organization will be obligated to take any action inconsistent with its bilateral agreements in effect with other countries and organizations.

IV. REPRESENTATION

The Committee shall consist initially of 14 members who shall be appointed with due regard to the necessity of maintaining a suitable geographical balance and representing the laboratories of those countries which are the most active in the field and to the desirability of providing full technical coverage. The six countries of the European communities and the Euratom Commission shall be represented by 5 members, the United Kingdom by 2 members, the other European countries of O.E.C.D. by 3 members, the United States by 3 members and Canada by 1 member. Appointments should be made in such a way that they provide continuity of membership.

The Committee may invite representation from other countries or international organisations.

V. ORGANISATION

The executive functions of the Committee shall be vested in a Chairman and a Scientific Secretary who shall be appointed for a two-year term and shall normally be members of the Committee. Appointments of successors to the Chairman and Scientific Secretary shall be made with due regard to the need to maintain a suitable geographical balance.

A Central Secretariat provided by the O.E.C.D. European Nuclear Energy Agency (ENEA) shall assist the Chairman and the Scientific Secretary in their work. Its main tasks will be to prepare meetings, co-operate with the Scientific Secretary in drawing up the minutes of meetings, and ensure the distribution and, if necessary the reproduction of Committee papers.

VI. MEETINGS

Intervals between meetings of the Committee shall normally not be less than five or greater than thirteen months. A host country shall make appropriate arrangements for each meeting.

VII. MINUTES AND OTHER DOCUMENTS

The Committee shall agree on and issue minutes drawn up by the Scientific Secretary and such other documents and recommendations as it may consider appropriate, according to agreed rules.

The Central Secretariat shall maintain official files of all Committee documents and shall receive copies of all the Committee's official correspondence.

APPENDIX B

List of Members and Corresponding Members of the European-American Committee on Reactor Physics

Dr. Alberto BRACCI	Director of the Laboratory for Reactor Physics and Computation, Comitato Nazionale per l'Energia Nucleare, Casaccia, ITALY.
Dr. Nicholas G. CHRYSOCHOÏDES	Director of Reactor Department, Nuclear Research Center "Democritus", Athens, GREECE.
Dr. Ayhan ÇILESIZ	Çekmece Nükleer Araştirma Merkezi, Istanbul, TURKEY.
Dr. John CRANDALL	Research Manager, Experimental Physics Division, Savannah River Laboratory, UNITED STATES OF AMERICA.
Mr. Eugene CRITOPH	Senior Research Officer, Reactor Physics Branch, Atomic Energy of Canada Ltd., Chalk River, CANADA.
Mr. Viking O. EPIKSEN	Director of Physics Division, Institute for Atomenergi, Kjeller, NORWAY.
Dr. Herbert J.C. KOUTS	Experimental Reactor Physics Group Leader, Brookhaven National Laboratory, UNITED STATES OF AMERICA.
Mr. Marko KÜCHLE	Intitut für Neutronenphysik und Reaktortechnik, Kernforschungzentrum Karlsruhe, FEDERAL REPUBLIC OF GERMANY.

Prof. Magnús MAGNÚSSON	University of Iceland, Reykjavik, ICELAND.
Dr. Fred C. MAIENSCHEIN	Associate Director, Neutron Physics Division, Oak Ridge National Labotatory, UNITED STATES OF AMERICA.
Dr. Rudolf MEIER	Head of Physics Department, Eidgenössische Institut für Reaktorforschung, Würenlingen (AG), SWITZERLAND.
Mr. François MOTTE	Head of Reactor Physics Section, Centre d'Etude de l'Energie Nucléaire, Mol, BELGIUM.
Mr. Peter W. MUMMERY	Deputy Director, Atomic Energy Establishment, Winfrith, UNITED KINGDOM.
Mr. Roger NAUDET	Département des Etudes de Piles, Centre d'Etudes Nucléaires de Saclay, FRANCE.
Prof. T.E. NEVIN	Professor of Experimental Physics, Physics Department, University College, Dublin, IRELAND.
Mr. Povl Lebeck ØLGAARD	Head of Reactor Physics Section, Research Establishment Risø, DENMARK.
Dr. Ramón ORTIZ FORNAGUERA	Head of Reactor Division, Junta de Energia Nuclear, Moncloa, SPAIN.

Dr. Rolf Torsten PAULI	Head of Reactor Physics Department, A.B. Atomenergi, Studsvik, SWEDEN.
Dr. Michael J. POOLE	Neutron Physics Group Leader, Atomic Energy Research Establishment, Harwell, UNITED KINGDOM.
Dr. Victor RAIEVSKI	Head of Reactor Physics Department, Commission de l'Euratom, Centre Commun de Recherche, Ispra, ITALY.
Mr. Antônio J. RAMALHO	Assistant, Reactor Division, Junta de Energia Nuclear, Savacem, PORTUGAL.
Dr. Bernard I. SPINRAD	Reactor Engineering Division, Argonne National Laboratory, UNITED STATES OF AMERICA.
Dr. Peter WEINZIERL	Head of Physics Institute, Österreichische Studiengesellschaft für Atomenergie, GmbH Seibersdorf, AUSTRIA.
Prof. Jan J. WENT	Head of Research Department, Naamloze Vennootschap tot Keuring van Electrotechnische Materialen, (KEMA), Arnhem, THE NETHERLANDS.

SECRETARIAT

Dr. Henri B. SMETS	Head of Research Office, O.E.C.D. European Nuclear Energy Agency, Paris 16e, FRANCE.

APPENDIX C

List of Documents presented at the First, Second and Third Meetings of the Committee

CLASS "A"

"Group of Experts for the Formation of a Reactor Physics Committee, Winfrith, 7th and 8th February, 1962 - Summary of Discussion", EACRP-A-1 (June, 1962).

"Reactor Physics Activities in O.E.C.D. Countries", EACRP-A-2 (May, 1962).

"Digital Computers for Reactor Studies", EACRP-A-3 (May, 1962).

Johansson, E., Jonsson, E., Neltrup, H., and Westcott, C.H.: "Design Proposal for D_2O Lattice Spectrum Measurements at Risø" (EANDC-20 "L"), EACRP-A-4 (April, 1962).

Critoph, E.: "Suggested Specific Topics for Consideration by the EARPC from the General Fields of (a) Physics of Heavy Water Lattices, (b) Neutron Energy Distribution in Reactors", EACRP-A-5 (June, 1962).

Küchle, M.: "Investigations on Heavy Water Latticos in the Federal Republic of Germany", EACRP-A-6 (June, 1962).

Pauli, R.: "Proposals to the First Meeting of the European-American Committee on Reactor Physics, Saclay, June 25th-27th 1962", EACRP-A-7 (June, 1962).

"Minutes of the First Meeting, Saclay, 25th-27th June 1962", EACRP-A-8 (Provisional) (September, 1962).

"List of Members and Corresponding Members of the EACRP", EACRP-A-9 (November, 1962).

EACRPA-A-9 (Rev. 1) (June 1963)

Poole, M.J.: "Proposal for Formation of an EACRP Heavy Isotopes Sample Bank", EACRP-A-10 (February, 1963).

Poole, M.J.: "Possible Basic Studies of Neutron Spectra in Fuel", EACRP-A-11 (February, 1963).

Kinchin, G.H.: "The Basis of Nuclear Data Requests", EACRP-A-12 (January, 1963).

Ortiz Fornaguera, R: "On the Role of Small Computers in Nuclear Reactor Calculations", EACRP-A-13 (January, 1963).

Stehn, J.R.: "Compilation of Requests for Nuclear Cross Section Measurements" (WASH 1040), EACRP-A-14 (September 1962).

Casini, G. and Tassan, S.: "Experimental Euratom Programme on UC Fuelled Lattices", EACRP-A-15 (January, 1963).

"Minutes of the Second Meeting, Zürich, 11th-14th February 1963", EACRP-A-16 (Provisional) (March, 1963).

"Stable Isotope Cross Section Research Pool Inventory", EACRP-A-17 (July 1963).

"Oak Ridge Sample Fabrication Activities", EACRP-A-18 (September 1963)

"ORNL Plutonium Inventory as of June 30, 1963", EACRP-A-19 (October 1963).

"Minutes of the third Meeting, Idaho Falls, 21st-25th October, 1963", EACRP-A-20 (Provisional) (November 1963)
EACRP-A-20 (final) (March 1964).

Went, J.J. and Eriksen V.O.: "Report on the Procurement of Data from Operating Power Reactors to Reactor Physicists", EACRP-A-21 (October 1963).

"Stable Isotopes and Targets available from A.E.R.E. Harwell", EACRP-A-22 (October 1963).

Pauli, R.: "Inquiry on Present and Future Needs for Activation Detectors for Neutron Flux Measurements (only Elements Z <90)", EACRP-A-23 (October 1963).

Arcipiani, B., Boeuf, A., Haemers, L. and Tassan, S.: "A measurement of the Effective U^{238} Resonance Integral of Natural Uranium Metal Clustered Fuel Elements Containing Organic Coolants" (DPR-341), EACRP-A-25 (October 1963).

Blässer, G.: "Theoretical Foundations of Parameter Oscillation Measurements", EACRP-A-26 (November 1962).

"Report of the European Part of the EACRP Sub-Committee on Nuclear Data Compilation", EACRP-A-27 (October 1963)

"Rapport d'Activité en Physique des Réacteurs - (France)" (Extrait de: Progress Report on Nuclear Data Research in the Euratom Community, EANDC(E)49 "L"), EACRP-A-29 (October 1963)

CLASS "L"

Raievski, V.: "The Physics of ORGEL Reactors" (DPR-170), EACRP-L-1 (June, 1962).

Raievski, V.: "The ECO Reactor" (DPR-174), EACRP-L-2 (June, 1962)

Naudet, R.: "Etude sur la physique des réseaux à eau lourdo", EACRP-L-3 (June, 1962).

Naudet, R.: "Calcul des sections efficaces effectives dans les réacteurs thermiques", EACRP-L-4 (June, 1962).

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