International Atomic Energy Agency

ANNUAL REPORT OF THE BOARD OF GOVERNORS TO THE GENERAL CONFERENCE

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LIST OF ABBREVIATIONS

ACC	Administrative Committee on Co-ordination
Agency	International Atomic Energy Agency
CCAQ	Consultative Committee on Administrative Questions
CCPI	Consultative Committee on Public Information
CCTA	Commission for Technical Co-operation in Africa South of the Sahara
CERN	European Organization for Nuclear Research
ECA	United Nations Economic Commission for Africa (of ECOSOC)
ECAFE	United Nations Economic Commission for Asia and the Far East (of ECOSOC)
ECE	United Nations Economic Commission for Europe (of ECOSOC)
ECLA	United Nations Economic Commission for Latin America (of ECOSOC)
ECOSOC	Economic and Social Council of the United Nations
ENEA	European Nuclear Energy Agency (of OEEC)
EPA	European Productivity Agency (of OEEC)
EPTA	United Nations Expanded Programme of Technical Assistance
EURATOM	European Atomic Energy Community
FAO	Food and Agriculture Organization of the United Nations
IANEC	Inter-American Nuclear Energy Commission (of OAS)
IBRD	International Bank for Reconstruction and Development
IBWM	International Bureau of Weights and Measures
ICAO	International Civil Aviation Organization
ICRP	International Commission on Radiological Protection
ICRU	International Committee on Radiological Units and Measurements
ICSU	International Council of Scientific Unions
ILO	International Labour Organisation or International Labour Office
IMCO	Inter-Governmental Maritime Consultative Organization
ISO	International Organization for Standardization
Mw	Megawatt
OAS	Organization of American States
OEEC	Organisation for European Economic Co-operation
SAC	Scientific Advisory Committee (of the Agency)
SCOR	Special Committee on Oceanic Research of the International Council of Scientific Unions
TAB	Technical Assistance Board (of the United Nations)

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
WHO	World Health Organization
WMO	World Meteorological Organization

NOTE

All sums of money are expressed in United States dollars.

INTRODUCTION

General

1. In this document the Board presents its report on the fourth year of the Agency's work.[1] Last year at this time the Board noted that the Agency had completed its first full year of normal operation. Most of the Agency's programs are now firmly established and as the Board has already forecast, 1961 is generally expected to be a year of consolidation.[2] Although more must be done to deepen and extend the effectiveness of present programs, the Agency has now reached the stage where it is capable of further developing certain of its operations. The direction and scope of such development will be determined largely by the rate of advance of nuclear technology - and particularly the pace of its extension to the less-developed areas - by the extent to which the Agency may be able to serve as a means for promoting scientific co-operation between the leading nuclear powers, as well as by the support it receives from all its Members.

Nuclear power and reactors

2. The prospects for nuclear power are discussed in their economic context in a separate report by the Board to the General Conference.[3] Events of interest in the Agency's work during the past year have included the completion of studies of nuclear power prospects in Finland and the Philippines, technical conferences on the economics and technology of small and medium power reactors and on nuclear ships, with special reference to safety problems. Of special note has been the start of a joint Norway-Agency reactor physics study using the research and experimental reactor facility NORA. The Agency has also arranged fuel supplies for projects in Finland and Yugoslavia, as well as for the NORA project itself.

Isotopes and radiation sources

3. With respect to the other main branch of nuclear science - radioisotopes and radiation - there has been much further advance in the last year. Wider applications are constantly being developed and established applications expanded. The various uses of radioisotopes and radiation have therefore, as in previous years, been the subject of a very substantial part of the Agency's work and it has been able to record reasonable progress in promoting their employment under safe conditions, in the less-developed areas. Thus over one third of the fellowships granted, nearly one third of the experts sent out, and approximately one quarter of the research contracts awarded have been concerned with the applications of radioisotopes and radiation. Radioisotopes and radiation have also figured prominently as subjects of the Agency's scientific information program. Six of the Agency's scientific meetings in 1960, including the largest, the Conference on the Use of Radioisotopes in the Physical Sciences and Industry, held at Copenhagen, also dealt with those subjects.

Radiation protection and regulatory activities

4. Progress has also been made in the past year in giving help or guidance to Member States on questions of safety and protection against radiation hazards. The Agency has paid special attention to establishing standards of basic radiological safety, safety of reactors and standards for the disposal of low-level radioactive waste. Studies have

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[1] For previous reports see documents GC(II)/39, GC(III)/73 and GC(IV)/114.

[2] INFCIRC/28, paragraph 4.

[3] GC(V)/161.

continued on the problems of disposing and monitoring of radioactive wastes into the sea and fresh water. In general, questions relating to the safety of nuclear installations and operations and the related matter of liability for nuclear accidents continue to play a somewhat greater part in the Agency's work than was foreseen in the initial program. A draft International Convention on Minimum International Standards Regarding Civil Liability for Nuclear Damage has been submitted to an inter-governmental committee set up by the Board, and a draft Convention on Liability of Operators of Nuclear Ships was discussed at the Diplomatic Conference on Maritime Law held in Brussels at the end of April 1961. Safety evaluations have been made for reactor projects in the Netherlands and in Switzerland and of reactor sites in Yugoslavia, and progress has been made in plans for an international system of emergency help in case of nuclear accidents, which is being studied jointly with WHO and the International Red Cross. The Agency is compiling data on reactor accidents and studying methods of evaluating harbors with regard to the safe handling of nuclear merchant ships. Much of the Agency's research also relates to protection against radiation hazards. Developments since the last report include the start of a three-year program of research on the effects of radioactivity in the sea which is being undertaken with the Government of Monaco and the Oceanographic Institute in that State.

Scientific and technical information

5. There has been some further growth in the Agency's main programs, of which nuclear power, the use of isotopes and nuclear safety form the hub. Thus, under the scientific and technical information program, the Agency held 13 meetings in the period under review. They were attended by nearly 2 000 participants from 54 Member States. The largest scientific meeting since the last report is referred to in paragraph 3 above; others of special interest were the Symposium on Radioisotopes and Radiation in Entomology (Bombay), the Symposium on the Use of Radioisotopes in the Study of Endemic and Tropical Diseases (Bangkok), the Symposium on the Detection and Use of Tritium in the Physical and Biological Sciences (Vienna), and the Conference on Nuclear Electronics (Belgrade). Some 50 scientific and technical publications were issued during the period under review, compared with 24 in 1959-60. The range of subjects covered is shown in Annex XIII. Of note was the first publication in October 1960 of a quarterly periodical journal on nuclear fusion and plasma physics. Work has also gone ahead on the review series and so far 16 numbers have been issued in this series. The routine technical information services to Member States have continued to grow during the year.

Technical assistance

6. The total value of technical assistance made available by the Agency in 1960 in the form of equipment, experts and fellowships can be estimated at $2 560 000.[4] This figure includes technical equipment and supplies to the value of about $360 000 provided in connection with technical assistance projects. Forty experts serving a total of 174 man-months were in the field. Under the 1960 fellowship program, 648 applications were received and 468 candidates were selected for awards. One regional and one international training course were organized in 1960 and five have been planned for 1961. Of the latter, one was held in Cairo in connection with the proposed establishment of the first Agency regional training center there, which was reported to the General Conference last year.[5] The two Agency mobile laboratories have continued to provide training courses in Latin America and the Far East.

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[4] This figure includes the estimated value of fellowships and equipment donated to the Agency by Member States as well as assistance granted from the Agency's own resources and EPTA.

[5] GC(IV)/114, paragraph 132.

Research and development

7. Under the Agency's program for promoting research and development, research contracts were awarded in 1960 to the value of $593 167. This sum covers the cost of both new and renewed contracts financed from the Agency's own funds ($502 477) and from external sources ($90 690). The 1961 program envisages the award of new, and the renewal of existing contracts to the value of $595 000 from Agency funds. The main fields of research covered have been the safe disposal of radioactive waste, health physics and radiation protection, and radiobiology. The Board has recently approved some changes in the direction and methods of planning this program. Arrangements will for instance be made to obtain further advice from SAC, and more emphasis laid on the promotion of isotope applications in agriculture, hydrology and medicine.

Safeguards

8. The question of the Agency's safeguards against diversion was again considered by the Board, following the resolution on this matter adopted by the General Conference at its fourth regular session [6]. The document previously submitted to the General Conference containing draft principles and procedures for implementing the safeguards provisions of the Statute [7] was reviewed by the Board in January, and the safeguards system was approved by a majority vote on 31 January 1961. It is set forth in document INFCIRC/26. The document sets out the general principles of the Agency's safeguards and contains detailed provisions for their application to research, test and power reactors with less than 100 Mw thermal output, to source and fissionable material used and produced in such reactors and to smaller research and development facilities. The transfer to the Agency of the safeguards provided for in agreements for co-operation in the peaceful uses of atomic energy between Canada and Japan and between the latter State and the United States of America is at present under study by the Secretariat.

Laboratory services

9. The small laboratory at Headquarters has concentrated on the measurements of radioactive contamination and has carried out a survey of environmental contamination of food in Austria at the request of the Austrian Government. Its work on environmental contamination and sampling is being reported to UNSCEAR. It has also developed its capacity to provide Member States with standard radiation samples for calibration purposes. This last work is being done in close co-operation with IBWM. Students from Austria, Indonesia, the Philippines, Poland and the United Arab Republic have come to the laboratory for training.

External relations

10. The Agency has continued to benefit from its close relationship with the United Nations and many of the specialized agencies. The latter have given much direct and indirect help in carrying out the Agency's program especially in matters such as the use of nuclear science in agriculture and medicine, radiation protection and the planning of research.

11. The Agency's share in EPTA rose from 1.1 per cent of EPTA resources or $277 870 in 1959 to 1.9 per cent or $592 000 in 1960 and $1 483 500 or 2.1 per cent for the two-year period 1961-1962.

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[6] GC(IV)/RES/71.

[7] GC(IV)/108, Annex.

12. The Agency's co-operation with ENEA and with IANEC is developing well within the framework of the agreements approved by the General Conference last year [8]. The programs of several other technical inter-governmental organizations outside the United Nations family and those of the Agency have increasingly affected each other and working relations have grown accordingly. Useful relations have also been maintained with the non-governmental organizations having consultative status with the Agency, whose number has increased from 14 at the time of the last report to 19 at the end of June 1961.

Administration and finance

13. The internal organization of the Secretariat has remained largely unchanged but the number of Member States from which the staff is drawn has now increased to 43 compared with 40 at the time of the last report.

14. As the General Conference is aware, some of the Agency's main activities are dependent upon voluntary contributions to the General Fund. The failure since 1959 of these contributions to reach the targets set represents the most serious financial problem the Agency has to face. The gravity of this problem has been recognized by the General Assembly of the United Nations in its resolution 1531 (XV), adopted unanimously by that body on 15 December 1960. The problem has been partly alleviated by the Agency's participation in EPTA [9], but its share in EPTA resources is still modest. In previous years special contributions have also helped to mitigate the effect of these shortfalls. There is at present no prospect of any development which would lessen the impact of the shortfall foreseen for 1961. On the basis of contributions pledged, it will be necessary to reduce by more than one third the expenditures previously approved in the operational budget for 1961. As an illustration of the effect of the lack of funds, the number of fellowships which can be awarded this year with present resources, including Type II fellowships, and those in prospect will be approximately 300 compared to 429 under the 1960 program. Similar sharp reductions are in prospect for the program for providing experts and equipment, research contracts financed from this source, the mobile isotope laboratories, and for the initial allotment to the Agency's functional laboratory.

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[8] GC(IV)/RES/68 and GC(IV)/RES/70 respectively.

[9] Of the technical assistance provided through the Agency in 1960 about $592 000 were financed from EPTA.

CHAPTER I. PLANNING AND ADMINISTRATION

A. The Board

15. The third Board held its last five meetings during the period under review, and the fourth Board met for the first time on 3 October 1960. On that occasion it elected Mr. A.D. McKnight (Australia) Chairman, and Mr. G. Nadjakov (Bulgaria) and Mr. C. Graef Fernandez (Mexico) Vice-Chairmen. The composition of both the third and fourth Boards, as well as of their committees, is given in Annex I.

16. Sitting in October 1960 and in January-February, April and June 1961, the fourth Board had met 46 times by the end of the period covered by this report. During this period its committees had held a total of 20 meetings.

17. The character of the Board's work has in the main reflected a continuation of the trends briefly noted in its last report to the General Conference [10]. The Board has again devoted a rather larger proportion of its time to discussion of the Agency's technical work, but has also paid considerable attention to activities of a regulatory nature. Another matter of note has been the consideration the Board has given to its own structure, as a consequence of the adoption by the General Conference of resolution GC(IV)/RES/85 relating to the representation of the area of "Africa and the Middle East".

B. The Scientific Advisory Committee

18. The Scientific Advisory Committee held its fifth meeting on 16 and 17 November 1960 in New York and its sixth meeting on 5 and 6 May 1961 in Vienna. Sir John Cockcroft, who is retiring from SAC, has been replaced by Sir William Penney.

C. New Member States

19. Two States became Members of the Agency during the period under review: Senegal became a Member by depositing an instrument of acceptance of the Statute on 1 November 1960 and Lebanon by depositing an instrument of ratification on 29 June 1961. Mali, whose membership was approved by the General Conference at its fourth regular session [11], has not yet deposited an instrument.

D. External relations

20. During the last year, the Director General, in some cases accompanied by senior officials of the Secretariat, visited Chile, Colombia, Costa Rica, El Salvador, Guatemala, India, Iran, Mexico, Peru and Venezuela with a view to developing or establishing contacts with the Governments concerned, or to attending events of importance in the development of nuclear science in those countries.

21. By the end of June 1961, 29 States had appointed Resident Representatives to the Agency, the number having increased by three during the period under review. A list of Resident Representatives is given in Annex II.

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[10] GC(IV)/114, paragraph 24.

[11] GC(IV)/RES/84.

22. On 12 December 1960, the Director General presented to the General Assembly the annual report of the Agency for 1959-60. Ten delegations took part in the ensuing discussion from which it was clear that the General Assembly continues to follow closely the work of the Agency. This was also shown by the unanimous approval by the General Assembly, on 15 December 1960, of a resolution calling for increased contributions to the Agency's General Fund [12]. The Director General's Permanent Representative at United Nations Headquarters and other senior officials also attended several meetings of the United Nations, its organs and committees at which matters of mutual interest were considered.

23. Pursuant to the authorization given by the General Conference [13], the Board has submitted an annual report to ECOSOC [14] covering the period 15 April 1960 to 31 March 1961. This report included the Agency's comments on the consolidated program appraisals prepared by the Committee on Program Appraisals of ECOSOC [15]. The comments contain a section indicating the extent to which the trends which the Agency foresaw in 1959 are being realized in practice.

24. The Board has also authorized the submission of the Agency's comments on another document to ECOSOC, dealing with the future development of science and technology. This is the Survey on the Main Trends of Inquiry in the Field of the Natural Sciences, the Dissemination of Scientific Knowledge and the Application of such Knowledge for Peaceful Ends [16], which was prepared under the authority of UNESCO. ECOSOC and the General Assembly of the United Nations have taken preliminary action on this survey and are giving attention to the recommendations for international action which emerged from it, several of which relate to matters of concern to the Agency. The comments of the various members of the United Nations family are being considered by ECOSOC at its thirty-second session this year.

25. Technical co-operation with the United Nations has continued in matters of mutual interest, such as the comparative economics of nuclear and conventional power, and with UNSCEAR on subjects such as radiation damage in bone and radioactive waste disposal. A preliminary report on the joint dosimetry experiment held at Vinca, Yugoslavia in April 1960 was also sent by the Agency to UNSCEAR. A more detailed account of the Agency's work on protection against radiation is given in Chapter II, section C below.

26. The Agency has maintained close relations with the regional economic commissions of the United Nations. It was represented at meetings of ECA, ECLA and ECAFE, at the ECE Inland Transport Committee Working Party on Transport of Dangerous Goods and at the ECAFE Fourth Regional Technical Conference on Water Resources Development. At the request of ECLA, the Director General has also submitted a general survey paper on nuclear power costs and their trends, with special reference to less-developed countries, for consideration at the seminar on electric power which will be held in Mexico in August 1961. The Agency also co-sponsored, with FAO and WHO, the ECE Conference on Water Pollution Problems in Europe, which was held in Geneva in February-March 1961. The Agency is further co-operating with the United Nations in the organization of the Conference on the Applications of Science and Technology to Needs of Under-Developed Countries, to be held in 1962.

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[12] General Assembly resolution 1531 (XV), the full text of which is reproduced in Annex III hereto.

[13] GC(IV)/RES/63.

[14] INFCIRC/28.

[15] United Nations document E/3347/Rev.1. It will be recalled that this document contains a review of the trends in the programs of the United Nations and of several related agencies during the next few years, as well as various proposals and conclusions drawn from these trends, and that the Director General, in consultation with the Board, submitted the Agency's contribution at the end of 1959.

[16] United Nations document E/3362.

EPTA and the Special Fund

27. Whereas for 1959 the Agency received - under special arrangements - a lump sum allocation from the funds of EPTA, 1960 was the first year in which the Agency's technical assistance program financed from these funds was prepared and developed fully in accordance with the normal programing procedure then in force. The Agency, together with the other participating organizations, took part in the new two-year programing procedure for 1961 and 1962 and is now engaged in implementing the program for the first of these two years [17]. The requests for assistance received from Governments again show a substantial increase over the 1960 program.

28. The Agency was represented at the fourth and fifth sessions of the Governing Council of the Special Fund. Although no request for a nuclear energy project has yet been formally submitted to the Special Fund, it is understood that the latter will be approached during 1961 or 1962 by one or two Member States in connection with projects for which it would be proposed that the Agency be designated as Executing Agency.

29. The Agency has also carried out a hydrological study in Greece, at the request of FAO which is serving as Executing Agency to the Special Fund in an irrigation project in that country. Consultations are being held within the framework of ACC about procedures which would enable the Agency to inform the Special Fund, in other appropriate cases, of the potential use of nuclear science in projects which Governments submit to it, and to make a scientific contribution to the execution of such projects.

Participation in the work of ACC

30. The Director General attended the thirty-first and thirty-second sessions of ACC held in October 1960 and May 1961 respectively. The Agency was also represented at all meetings of ACC's Preparatory Committee held during the last year. Pursuant to ECOSOC resolution 799 B III (XXX), ACC asked the Agency to prepare the preliminary documents needed to enable ACC to undertake the first multilateral review of the activities of the United Nations family relating to atomic energy. The results of this review are being reported to ECOSOC at its thirty-second session.

The specialized agencies

31. In view of the growing number of questions of mutual interest to the Agency and IMCO relating to the nuclear propulsion of merchant ships, the prevention of radioactive contamination of the sea and the carriage of radioactive materials by sea, the Board is submitting to the General Conference a draft relationship agreement with that organization [18]. The agreement was approved by the Assembly of IMCO in April and requires only the approval of the General Conference to enter into force.

32. The Agency and the specialized agencies with which relationship agreements had previously been concluded (ILO, FAO, UNESCO, WHO, ICAO and WMO) have continued to be represented at meetings of each other's governing bodies and conferences, as well as at scientific meetings and panels of experts. An increasing number of scientific meetings and training courses have been organized in collaboration with certain specialized agencies. These are described in more detail later in the report.

Inter-governmental organizations outside the United Nations framework

33. Following the entry into force of relationship agreements with ENEA and IANEC, various detailed plans for co-operation with these organizations have been worked out by the secretariats and have been put into effect. As a consequence, the work of the Agency

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[17] The Agency's share in EPTA's resources is shown in paragraph 11 of the Introduction.

[18] GC(V)/153.

in the regions concerned is being co-ordinated with that of these bodies. With respect to ENEA this is shown, for example, by the close co-operation in the formulation of recommendations relating to nuclear safety and the work on civil liability for nuclear damage. With regard to IANEC, the relationship agreement is being implemented by the joint organization of scientific meetings and various other measures for pooling the scarce resources available for the development of nuclear technology in the region.

34. In accordance with the authorization of the Board, the Director General is also maintaining close working relations with the secretariats of several other technical intergovernmental bodies dealing primarily or incidentally with the peaceful uses of atomic energy. These include CERN, the Joint Institute for Nuclear Research, EURATOM, CCTA, the Nordic Organization for Theoretical Nuclear Physics, the European Conference of Ministers of Transport, the Customs Co-operation Council, IBWM, the Central Office for International Railway Transport, the Central Commission for the Navigation of the Rhine and the Danube Commission. Representatives of these bodies continue to attend Agency panels on special subjects in which they are interested and to provide technical advice on various aspects of the Agency's work.

Non-governmental organizations

35. By 30 June 1960 consultative status had been granted to 19 non-governmental organizations, the following five having been granted such status during the last year: the European Atomic Forum, the European Confederation of Agriculture, the International Air Transport Association, the International Cargo Handling Co-ordination Association and the International Federation of Documentation. A complete list of the non-governmental organizations having consultative status with the Agency is given in Annex IV.

36. The relations between the Agency and non-governmental organizations were described in some detail in last year's report [19], and the Board has little to add at this stage. The Agency has continued to receive valuable help from several of these bodies, particularly in preparing and implementing its recommendations on radiation protection and safety, and third party liability, in planning and developing its technical programs - for instance, by participation in the Agency's panels - and in publicizing its work.

E. Administration

Personnel

37. On 30 June 1961 the staff of the Agency, including candidates who have accepted offers of appointment and will report for duty shortly, was composed of 228 staff members in the Professional category and above, and 308 staff members in the General Service category, as compared with 194 staff members in the Professional category and above, and 271 staff members in the General Service category on 30 June 1960.

38. The number of nationalities represented among that portion of staff which is subject to geographic distribution is 43, as compared with 40 on 30 June 1960.

39. The contractual status of the present staff is as follows:

(a) Professional category and above

Permanent and probationary appointments	67	
Fixed-term appointments	154	
Seconded from other international organizations	7	228

[19] GC(IV)/114, paragraphs 59-61.

(b) General Service category

Permanent and probationary appointments	177	
Fixed-term appointments	131	308

40. The turnover of staff in the Professional category and above was considerably greater than in previous years, due to the fact that a sizeable number had completed three years' fixed-term assignments, but on the whole the recruitment of qualified personnel has progressed satisfactorily. A somewhat slower rate of recruitment of staff members of scientific and technical competence is explained by the difficulty of locating and obtaining the release of qualified candidates from all geographical areas.

41. During the period under review the Agency was again called upon to arrange a large number of scientific and technical conferences, panels and symposia; in this connection 410 short-term contracts were issued.

Finance

42. The budget for 1961 was reviewed by ACABQ whose report was noted by the General Assembly at its fifteenth regular session.

1. Regular program

(a) The financial year 1960

(i) Assessments

43. The total assessed contributions for 1960 of Member States included in the scale of assessment for that year amounted to $5 843 000. With the addition of Chile, Colombia, Ghana and Senegal as Members of the Agency, total assessments for 1960 were increased by $37 980 to $5 880 980. The percentages for which these new Member States have been assessed are as follows:

Member State	Percentage
Chile	0.25
Colombia	0.29
Ghana	0.06
Senegal	0.05

(ii) Receipts

44. By 31 December 1960 the Agency had received contributions towards the regular budget for 1960 amounting to $5 312 034, representing 90.33 per cent of the total contributions due for that year.

45. By 30 June 1961 the total received rose to $5 441 500 or 92.53 per cent of the total contributions due for 1960 [20].

(iii) Expenditure

46. Expenditure during the financial year 1960, including unliquidated obligations, amounted to $5 179 980. This expenditure left a provisional budgetary surplus of $816 034, made up as follows:

Budgetary savings	$663 020
Miscellaneous income (including $37 980 assessments on new Member States)	$153 014
Budgetary surplus for 1960	$816 034

[20] See Annex V which shows outstanding contributions to the 1958, 1959 and 1960 regular budgets.

47. Unliquidated obligations as at 31 December 1960 were $676 692, of which $348 910 had been liquidated by 30 June 1961.

48. While the provisional budgetary surplus for 1960 was $816 034, contributions outstanding for the same year amounted to $568 946, leaving a provisional cash surplus of $247 088.

(iv) Transfers between sections of the 1960 budget

49. Apart from those shown in last year's report [21], no transfers were made between sections of the 1960 budget.

(b) The financial year 1961

(i) Assessments

50. One of the four States that joined the Agency in 1960, i.e. Chile, was included in the scale of assessment for 1961 which was adopted by the General Conference at its fourth regular session [22]. Consequently, the percentage assessments of several Member States were reduced slightly as compared with their 1960 percentages. These reductions had the effect of slightly reducing the advances to the Working Capital Fund for which these States were assessed and the differences were deducted from their outstanding budgetary contributions.

51. Similar deductions were made from the outstanding contributions of Member States in respect of their shares in the 1958 cash surplus.

52. The assessments towards the regular budget for 1961 of the three States which joined the Agency in 1960 too late for inclusion in the scale for 1961 total $24 672. Their percentage assessments are as follows: Colombia 0.29, Ghana 0.06 and Senegal 0.05. The assessment for Lebanon, which became a Member on 29 June 1961, is $3 084 towards the regular budget for 1961; its percentage assessment is 0.05.

(ii) Receipts

53. By 30 June 1961 advances to the Working Capital Fund and contributions to the regular budget for 1961 had been received as follows:

Advances to the Working Capital Fund	$1 996 600
Contributions to the 1961 regular budget	$2 572 371

54. By that date Member States had thus paid 99.38 per cent of the total advances due to the Working Capital Fund, and 41.52 per cent of the total contributions due to the 1961 regular budget [23].

2. Operational program

(a) General Fund for 1960

(i) Pledges and receipts

55. Of a total amount of $996 103 pledged to the General Fund for 1960, $931 480 had been paid by 31 December 1960. By 30 June 1961 a further amount of $63 888 had been received, leaving a balance of $735 still to be paid [24].

56. As compared with the target of $1 500 000 set for 1960 by the General Conference at its third regular session, there was a shortfall of approximately $500 000 in the actual pledges made by Member States.

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[21] GC(IV)/114, paragraphs 78-80.

[22] GC(IV)/RES/82.

[23] See Annexes VI and VII respectively.

[24] See Annex VIII.

(ii) Expenditure

57. Operational expenditure during 1960 amounted to $1 198 087. Unliquidated obligations as at 31 December 1960, including obligations brought forward from previous years, amounted to $949 689.

(b) General Fund for 1961

58. The total amount pledged to the General Fund for 1961 as at 30 June 1961 was $1 181 372 of which $823 715 had been paid by that date [24].

3. Special accounts

59. During the financial year 1960 two special accounts were established:

(a) The first from funds provided by the United States of America for the Agency's research contract program [25]; and

(b) The second following the contribution by the Federal Republic of Germany of an amount of $10 000 towards the Agency's project for determining the world-wide distribution of hydrogen and oxygen isotopes in water [26]. This project forms part of the 1961 program and budget.

Legal matters

60. A large part of the legal work done during the period under review has again been connected with the Agency's technical activities and is reflected in Chapter II, section C of this report. It included the preparation of agreements in connection with the supply of special fissionable materials [27], the provision of technical assistance by the Agency, the establishment of a joint research program on effects of radioactivity in the sea [28], and the Agency's research program.

61. Five instruments of acceptance of the Agreement on the Privileges and Immunities of the Agency, approved by the Board on 1 July 1959, have been deposited with the Director General [29].

62. As required by Article XXII.B of the Statute and by the Regulations for the Registration of Agreements [30] the agreements entered into by the Agency with Member States, and with organizations, between 1 July 1960 and 30 June 1961, have been registered with the Agency and, where so required, with the United Nations. In implementation of Article VI of the Regulations the Director General is communicating to Member States and to the Secretary-General of the United Nations a list of agreements registered with the Agency during the period mentioned above [31].

The Agency's Headquarters

63. Office premises in the first four floors of the building next to the main block of the Agency's temporary Headquarters have been renovated and these were brought into use in April 1961. It is hoped that by September 1962 the new meeting room for the Board

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[25] On the basis of research contracts amounting to $274 764 an amount of $145 611 was advanced to the Agency by 30 June 1961.

[26] See GC(IV)/116, paragraph 188 and GC(IV)/OR.38, paragraph 83.

[27] See for example INFCIRC/24 and Add.1.

[28] INFCIRC/27.

[29] INFCIRC/9/Rev.1.

[30] INFCIRC/12.

[31] INFCIRC/21/Add.1, to be issued after 30 June 1961.

of Governors will have been finished as well as accommodation for small scientific conferences and panels. It is also anticipated that by that time the Agency's document reproduction services, which are still housed in the Neue Hofburg, can be moved to the temporary Headquarters, so that the entire Secretariat and the Board will be accommodated in a single building. The Austrian Government is paying the main costs of the renovation and the Agency is bearing the expenses for special equipment for conference facilities.

64. Pending the final selection of a permanent site for the Headquarters of the Agency, the Austrian Government is holding in reserve three tracts of land which would be suitable for this purpose. For the construction of a permanent site an area of not less than 20 000 - and preferably 30 000 to 35 000 square meters - would be required.

The Agency's laboratory at Seibersdorf

65. Certain delays have taken place in the completion of the Agency's laboratory at Seibersdorf and the Board is giving this matter its attention. As soon as the laboratory is completed, the work will begin of transferring the existing metrology and standardization, environmental contamination and chemistry sections of the present laboratory at the Agency's Headquarters to the new building.

CHAPTER II. SCIENTIFIC AND TECHNICAL WORK

66. This chapter describes the main scientific and technical work of the Agency relating to the development of nuclear power (including the procurement and supply of raw materials and reactor fuels), the application of radioisotopes and radiation and protection against radiation effects.

A. Nuclear power, reactors, fuels and materials

1. Economic and technical studies of nuclear power

67. Economic and technical studies have been guided by General Conference resolutions GC(II)/RES/27 and GC(III)/RES/57, which are concerned with assistance to less-developed countries with the development of nuclear power. At its fourth regular session, the General Conference adopted resolution GC(IV)/RES/86, in which it recommended that nuclear power surveys should continue to be carried out in Member States, at their request, and that the Agency should pursue and develop general studies of nuclear power costs.

68. The Agency has been accordingly engaged in the following activities:

(i) The collection and distribution of technical and cost information on power reactors;

(ii) The development of methods for the evaluation and use of this information; and

(iii) Studies of specific cases requested by Member States.

69. When collecting technical information, the Agency follows very closely the development of different power reactor systems and the problems which may arise from their operation in less-developed countries.

70. The Agency has prepared a survey of the latest data on power reactor costs and is completing a second, up-to-date, expanded version which is expected to be published in 1961. In addition, a general survey paper on the status of power reactors, and on nuclear power costs and their trends, with special reference to less-developed countries, was prepared at the request of ECLA, for submission to its seminar on electric power which is to be held in August 1961 in Mexico.

71. The Agency has provided some assistance and advice to Member States on tentative nuclear power projects and plans. The type of assistance requested necessarily differs according to the degree of industrialization of the country concerned. In industrialized areas, the advice sought from the Agency is likely to be in connection with contemplated nuclear power projects. The Government of Brazil requested the Agency to provide experts on third party liability and nuclear safety in connection with the 150-200 Mw nuclear power station which is being planned in the Rio de Janeiro/São Paulo area (the Mambucaba project).

72. Where the installation of a first nuclear power plant is under consideration in countries which already have considerable experience in conventional energy production and distribution, the Agency's assistance could take the form of an analysis of the conditions under which such a power plant could profitably be installed within an existing power network. The Government of Finland invited the Agency to collaborate in studies to determine the extent to which nuclear power will be needed in the next decade. The results of these studies have now been published in a report [32] which, after giving an estimate of the development of power demand and supply in Finland for the next ten years, sets out the conditions under which nuclear power could compete with conventional alternatives. It is concluded that under certain conditions a 250 Mw (electrical) nuclear power plant might be operated economically with an 80 per cent load factor by 1970.

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[32] Prospects of Nuclear Power in Finland, Technical Reports Series No. 2, STI/DOC/10/2.

73. In less-industrialized areas the role of the Agency was on a wider basis, involving critical analyses of the national energy and electric-power forecasts. At the request of the Government of the Philippines in October 1960 the Agency dispatched to that country a team composed of two nuclear power specialists and a United Nations natural-resources economist, to investigate the prospects for nuclear power in the Manila area in the next decade, within the context of the country's economic development and its fuel and power situation. The nuclear power studies referred to may also serve as a guide to other Member States contemplating the installation of nuclear power, in that they illustrate the problems which may be encountered at different stages of industrialization.

74. Enlarging upon the offer it made at the third regular session of the General Conference, the Government of the United States of America is now enabling the Agency to follow closely the technical work undertaken in the United States on the design, construction and start-up of seven small power reactors representing four different types. The Agency is making use of this offer by sending small teams of scientists, at approximately six-monthly intervals, to discuss, for periods of about three weeks, with Government authorities and with the designers and builders of these plants such topics as design criteria, siting, reactor safety, construction experience, cost breakdown, training of personnel, handling of irradiated fuel and the start-up, operation and maintenance of the reactors.

75. Discussions are in progress with United States authorities about placing a few Agency-sponsored fellows who would receive training on one or more of these projects.

76. The Secretariat is contributing to the program by giving its views on the most suitable characteristics for power reactors that are to be used in less-developed countries, and by providing assessments of prospects for nuclear power. The Director General is preparing a detailed report on the experience gained through participation in this program.

2. Reactor research

77. The Agency is co-operating with the Norwegian Government in a scientific research program on reactor physics using the zero power reactor facility NORA. The program began in March 1961 and is expected to last approximately three years. The fundamental reactor physics data on heavy water, light water and mixed lattices will be measured with high precision. This work will serve to check the accuracy of theoretical reactor calculations and will help the designers of power reactors in choosing the best data for particular reactor systems.

78. As part of the reactor physics program a seminar was held in Vienna from 25 to 29 April 1960, on Codes for Reactor Computations, at which methods of machine calculation for the design of reactors were discussed. The proceedings of the seminar were published early in 1961. [33] A Seminar on the Physics of Fast and Intermediate Reactors is planned for August 1961.

79. A Conference on Small and Medium Power Reactors was held in Vienna in September 1960, at which the technical and economic aspects of such reactors and their suitability for use in less-developed countries were considered. The United Nations and IBRD participated, the United Nations contributing a paper on characteristic features of the power situation in less-developed countries.

80. The conference showed that intensive work is being done to develop small and medium power reactors and make them competitive with the conventional alternatives for the less-developed countries.

81. A Symposium on Inelastic Scattering of Neutrons in Solids and Liquids was organized by the Agency and held in Vienna in October 1960. This symposium dealt with the influence of the thermal vibrations of atoms in solids, liquids and molecules on the process of the slowing down and thermalization of neutrons in moderators, which is of great importance to reactor design. Papers were presented on various aspects of the general theory, methods and results of neutron spectrometry; neutron scattering in solids and liquids and by molecules; neutron scattering by cold moderators; and cooling of neutrons.

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[33] Codes for Reactor Computations, STI/PUB/24.

82. At the Symposium on Pile Neutron Research in Physics, convened by the Agency in Vienna from 17 to 21 October 1960, an opportunity was provided for physicists from newly completed reactor centers encountering the problems inherent in the planning and implementation of the initial stages of a nuclear research program, to exchange information with physicists from centers that have already accumulated considerable experience in the use of research reactors. The research uses of pile neutrons in nuclear physics, and in solid and liquid state physics were discussed and a special session was devoted to consideration of pile neutron research in the less-developed countries.

83. A survey has been made of published material on the chemical applications of research reactors. The survey covered such subjects as reactor recoil and pile radiation chemistry, isotope production and activation analysis and may be helpful to new reactor centers. An article for a review is being prepared on the results of the survey.

84. The third volume of the Directory of Reactors was published late in 1960. A supplementary volume is being prepared which will contain descriptions of new reactors and data on reactors not included in the preceding volumes.

3. Nuclear fuels and equipment

85. Only small quantities of nuclear fuels have so far been supplied under the auspices of the Agency. Some of the reasons for this have already been referred to in last year's report [34].

86. Materials which can be supplied through the Agency include natural and enriched uranium, thorium and its compounds, and monazite. Natural and enriched uranium is available for supply to Agency projects under supply agreements with the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and the United States of America. Substantial quantities of uranium chemical concentrates such as UO_2, UO_3, U_3O_8 (uranium oxides) and UF_4 (uranium fluoride) have been made available for supply to Agency projects by Belgium, Canada, Portugal, South Africa, Spain and the United States. India has made thorium and its compounds available, and Ceylon has offered supplies of monazite. The Agency is thus able to draw upon plentiful supplies of nuclear materials from these Member States. Although the prices at which these materials would be supplied by the offering countries are not yet known in all cases, it would appear that the lowest domestic or international market prices generally apply.

87. A Conference on Nuclear Electronics was held in Belgrade in May 1961. Papers were presented dealing with the electronics used in nuclear research and applications.

88. Among the main topics discussed were the radiation detection, circuitry in fast and classical electronics, multichannel analyzers, and advanced electronics systems used in nuclear research. A scientific exhibition showing the new developments in various countries in nuclear electronics was held in connection with the conference. The following countries submitted exhibits: Austria, the Czechoslovak Socialist Republic, Denmark, France, Israel, Italy, Japan, Poland, Romania and Yugoslavia.

89. Using the fairly substantial information it has now collected and classified, the Agency has given technical advice to several Member States about sources of supply for nuclear fuels and specialized equipment. It has also helped Member States select instruments for particular research purposes.

90. Arrangements have been concluded between the Agency, the Government of the United States and the Government of Finland, to provide for the transfer of enriched uranium for the Triga Mark II research reactor supplied by the United States to Finland through the mediation of the Agency. In this case the Agency was able to make use of a grant of $50 000 from the United States to provide the material free of charge.

91. The Board has approved in principle the supply of three kilograms of enriched uranium from the Union of Soviet Socialist Republics for a critical assembly for Finland. When the final design of the assembly has been completed, and the required data has been submitted, a supply agreement will be concluded.

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[34] GC(IV)/114, paragraphs 4 and 5.

92. Under an agreement between the Agency, Norway and the United States, a fuel charge of uranium enriched to 3 per cent in uranium-235, used in designing the reactor for the nuclear ship "Savannah", will be leased to Norway for the zero power reactor NORA. This is being used in the joint Agency-Norwegian program of scientific research referred to in paragraph 77 above. As two fuel charges are being provided by Norway, one of natural uranium and the second of uranium enriched to 1.7 per cent in uranium-235, studies with three cores of fuel enriched to different degrees will be possible.

93. The Board has also approved a request from the Government of Yugoslavia for the Agency's assistance in securing from the United States a Triga Mark II research and training reactor, to be located at the Nuclear Institute "Josef Stefan" at Ljubljana, and for 2.62 kg of uranium enriched to 20 per cent in the isotope uranium-235 needed for the operation of the reactor.

B. Radioisotopes and radiation

94. The application of radioisotopes and radiation to medicine, agriculture and industry has continued to be an important part of the Agency's technical assistance activities, which are described in Chapter III below. An account is given below of the Agency's work to promote wider use of radioisotopes, and of the research and studies being undertaken to improve existing knowledge of the subject.

1. Medicine

95. The first use of radioisotopes and radiation techniques in developing countries is usually in medicine - for diagnostic, clinical research, or radiation therapy purposes.

96. Five research contracts on the medical uses of isotopes were renewed with institutes in Greece, Iraq, Israel, the Philippines and Thailand, and one new research contract was granted to an institute in South Africa. All these contracts are concerned with diseases which affect a large proportion of the population of tropical or sub-tropical climates, such as those caused by malnutrition or infection from parasites.

97. A Symposium on the Use of Radioisotopes in the Study of Endemic and Tropical Diseases was jointly held by the Agency and WHO in Bangkok in December 1960. Papers were presented dealing with applications of isotopes, diagnosis and clinical research on tropical diseases. Separate sessions were devoted to nutritional deficiencies, anemias, endemic goiter, water and electrolyte metabolism, medical entomology and parasitology. The discussions provided indications of the way in which the Agency's research contract program in tropical medicine could be further developed.

98. At the Symposium on Whole Body Counting held in Vienna in June 1961 papers presented dealt especially with the medical and health physics aspects of this subject. The sensitivity of radiation detection, calibration techniques, metabolic studies, the estimation of radioactive contamination and methods of processing the data acquired in such studies were considered and a number of new applications of these rapidly developing techniques were discussed.

99. Several of the recommendations made in August 1959 by a Study Group on the Use of Radioisotope Teletherapy Units and Supervoltage Radiation in Radiotherapy have been implemented. These recommendations, together with background material, have been published. A bibliography on the Application of High Energy Radiations in Therapy supplements the previously published International Directory of Radioisotope Teletherapy Equipment. A further panel on which WHO was also represented was convened in November 1960 to review physical data and information obtained from various major radioteletherapy centers on dose distributions with high energy radiation. Recommendations of this group have been published by the Agency under the title Therapeutic Dose Distributions with High Energy Radiation.

100. Work on the dosimetric aspects of radioteletherapy has made considerable progress and a large number of radiation isodose curves have been selected for publication in the latter part of 1961. In this connection, the joint Agency/WHO/ICRU Study Group on the

Standardization of Radiological Dosimetry for Radiation Beams, held in Geneva in April 1961, has reviewed and discussed various aspects of clinical dosimetry. This will greatly assist further standardization work and provide a basis for an international comparison of data and results of research on the use of radiation beams to treat malignant diseases.

101. Preparations have been made to calibrate and standardize thyroid radioiodine uptake measurements and to compare the results with those in various countries. A small panel of experts met in Vienna in November 1960 to advise the Director General on the technical problems of this comparison which would take into account results obtained under widely different conditions. The panel also recommended for universal adoption a standard method of carrying out these measurements.

102. A medical expert was included in each of the two preliminary assistance missions which visited El Salvador, Guatemala, Mexico, Paraguay and Peru and Ghana. [35] In addition, staff members went on short-term missions to the Czechoslovak Socialist Republic, Iran and Thailand to advise on specific problems connected with the medical use of radioisotopes. One visiting professor was provided to Yugoslavia to give assistance on similar problems.

103. In the medical applications of radioisotopes the Agency has awarded 45 fellowships under the 1960 fellowship program and one research grant, and the two mobile radioisotope laboratories were used to provide basic training in isotope techniques to physicians and hospital physicists.

104. So far, the provision of 16 technical assistance experts by the Agency has been approved under the Regular Program and under EPTA in medical isotope applications, hospital physics, cancer research and radiotherapy.

2. Agriculture

105. The Agency's work in connection with the use of radioisotopes in agriculture and agricultural research has been concentrated for the main part on problems such as crop improvement, pest control and fertilizer uptake. It may be noted that SAC has recommended that special stress be laid on this program and on the related subject of silviculture, including research on the use of isotopes to expedite the growth of trees and thereby promote rapid afforestation.

106. Three research contracts on the agricultural uses of radioisotopes were renewed with institutes in Japan and Yugoslavia and six new contracts were granted to institutes in China, the Federal Republic of Germany, Italy, Portugal and the United Kingdom. These contracts are concerned with fertilizer problems, the improvement of crop yields and the use of large radiation sources to produce useful mutations in plants and increase their resistance to disease.

107. A Panel on the Uses of Radioisotopes in Soil-Plant Relations and Fertilization Studies was held in Vienna from 15 to 19 May which concentrated on those uses which are expected to be of direct benefit to less-developed areas. Special sessions were devoted to the problems of tropical crops, especially rice. Eleven experts, including one staff member of FAO, covered various aspects of soil physics, soil chemistry, soil fertility, crop physiology and fertilizer technology and made detailed recommendations. They emphasized the importance of nuclear methods but pointed out that sufficient knowledge of local problems and competent local staff were required for these methods to be effective.

108. A small group of consultants met at Vienna in April 1961 which assisted the Agency's staff in its preliminary study of the disinfestation of grain by radiation. As insect pests in stored grain and other products can represent a serious threat to food supplies, especially in tropical and sub-tropical areas, the consultants recommended that the application of radiation to disinfestation should be carried to the stage of engineering development and that the Agency should take all possible measures to bring these techniques to a stage of practical application.

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[35] Members of the mission to Ghana also visited Dahomey, Liberia and Nigeria.

109. A Symposium on the Effects of Ionizing Radiation on Seeds and their Significance for Crop Improvement was held in co-operation with FAO in August 1960 at Karlsruhe, Federal Republic of Germany. The effects of various radiations on seeds, as well as the application of radiation effects for the improvement of crops, were considered in relation to the environmental factors involved. Papers were presented on a number of topics including the isolation of improved marketable varieties of wheat, barley, rice and peas, making use of irradiation methods of inducing hereditary changes in conjunction with standard procedures of selective breeding. The active interest shown by participating scientists from less-developed as well as technically advanced countries indicated the importance of the use of nuclear energy for the improvement of crops and for greater yields in food production in the campaign against hunger.

110. At the Symposium on Radioisotopes and Radiation in Entomology, organized by the Agency in Bombay in December 1960, the use of radioisotopes and radiation in controlling insect pests was discussed. This subject is receiving rapidly increasing attention. It is essential that opportunities be provided for the exchange of information on the use of radiation techniques to control insect damage to the typical agricultural products of less-developed areas. The symposium was the first scientific meeting organized by the Agency in Asia.

111. The Agency is co-operating with an ENEA study group on a detailed evaluation of specific applications of food irradiation. Joint regional food irradiation programs are being worked out and proposals are being considered to set up a permanent panel to consider questions relating to the health and safety aspects of irradiated food. On request, the Agency's staff is contributing regularly to the Quarterly International News Letter "Food Irradiation", which is sponsored by EPA and published by the European Information Center for Food Irradiation, Saclay, France.

112. An international training course on radioisotope techniques in soil-plant aspects of agricultural and forestry research, for which the isotopes were provided by the Government of the United Kingdom, has been held jointly with FAO and in co-operation with the Netherlands Government in Wageningen, Netherlands, from 4 April to 26 May 1961. Twenty students attended the course at which Dutch scientists and several staff members gave lectures and conducted demonstration experiments.

113. An agricultural expert was included in the preliminary assistance mission to El Salvador, Guatemala, Mexico, Paraguay and Peru and the mission to Ghana. [35] In addition, members of the Secretariat went on short-term missions to Costa Rica, Haiti and Pakistan. In the course of these missions, assessments were made of research needs in agriculture, in particular in soil chemistry, fertilizer applications, foliar nutrient feeding, genetics, plant breeding, growth regulators, animal biology and insect control.

114. In the agricultural applications of radioisotopes the Agency has awarded 36 fellowships and one research grant under the 1960 fellowship program. In addition, the two mobile radioisotope laboratories have been used to provide basic training in isotope techniques for agricultural and veterinary scientists.

115. So far the provision of 15 technical assistance experts by the Agency has been approved under the regular program and under EPTA in agricultural isotope techniques, entomology, plant biology, plant physiology, farm animal nutrition and veterinary radiochemistry.

3. Industry and the physical sciences

116. Several countries have published information on the industrial savings achieved from the use of radioisotopes, and the Agency has begun a critical survey of this information, which compares the results reported by various Member States.

117. Much information is available about the applications of isotopes in science and industry. Most of this data has however been published in a somewhat scattered and haphazard way as new results have been reported, and they have appeared in scientific periodicals rather than in those devoted to particular industries. It is believed that as a result,

even in the advanced countries, industry is not yet sufficiently aware of potential applications. The Agency has therefore also begun a systematic survey of radioisotope applications by industry instead of by the technique involved.

118. The Agency is also making an economic study of the production, import and distribution of radioisotopes in Member States. Among the questions being studied is whether it is more economical to import radioisotopes from the major producing countries or to manufacture them domestically if small research reactors are locally available. The subject is of particular interest to a number of Member States now installing such reactors. The study covers the economics and manpower requirements for starting domestic production.

119. The major Agency scientific meeting in 1960 was a Conference on the Use of Radioisotopes in the Physical Sciences and Industry. It was held in Copenhagen in September and was organized with the co-operation of UNESCO. Papers were presented on the manifold applications of radioisotopes in the various branches of the natural sciences such as nuclear physics, chemistry and metallurgy, as well as on their use in industrial processes.

120. From the proceedings of the conference it was clear that radioisotope applications are not only growing in variety but rapidly emerging from the stage of being a subject for officially sponsored research and experiment to that of standard industrial technique. Many of the delegates came from technical and industrial groups and a large number of the papers dealt with or bore upon industrial applications. Among the industrial uses, about which information was given at the conference, were methods for prospecting for ore and coal deposits, various applications in oil refineries, the latest developments in thickness gauging, the growing importance of the use of tracers in the measurement of machine and engine wear, leak detection, measurements of gas and liquid flow, metallurgical research and, in particular, use of radioisotope techniques in the production and analysis of the semi-conducting metals used in transistors.

121. Among the more novel applications described were the dating of ancient coins and medieval monuments and various meteorological uses of radioisotopes.

122. At the Symposium on the Chemical Effects of Nuclear Transformations, held in Prague in October 1960, papers were presented on the chemical effects of transformations of nuclei in gaseous, liquid and solid systems. Many of these covered research being done on the tempering of radiation damage by heat, X-rays or gamma radiation. Others showed the results of original investigations on "hot" atom reactions, as well as some hypotheses based on these investigations. It is considered that this symposium, at which nearly all laboratories interested in "hot" atom chemistry were represented, will stimulate further research.

123. The Agency has awarded 56 fellowships and one research grant in nuclear chemistry and 67 fellowships and four research grants in nuclear physics under the 1960 fellowship program.

124. The provision of 37 technical assistance experts by the Agency has been approved under the regular program and under EPTA in nuclear physics, metallurgy, radiochemistry, radioisotope applications, reactor programing, "hot" laboratory design and construction, and radioisotope production.

125. A regional training course on radioisotope techniques was held in Cairo from 20 March to 20 May 1961 in co-operation with the Government of the United Arab Republic. The purpose of the course was to teach the basic principles of isotope applications in various branches of science. Twenty students from eight countries attended the course. The teaching staff consisted of scientists provided by the Government of the United Arab Republic, two scientists from Austria and the Netherlands provided under the Agency's auspices and one member of the Secretariat.

4. Radiation standards

126. For all operations in which substantial amounts of radiation are used, such as medical radiology, industrial radiography, thickness gauging, etc., it is essential to have accurate reference sources against which the radiation emitted by the source in use can be

checked. Work has therefore continued during the period under review to enable the Agency to provide such reference sources. This work has been done in the small laboratory set up at the Agency's Headquarters.

127. The program has consisted of:

(a) Studies of methods to be used for the absolute measurement of the activity of reference sources. The following methods have been studied:

(i) The standardization of beta emitting radionuclides using a 4-pi proportional counting;

(ii) The standardization of beta and gamma emitting radionuclides by beta-gamma coincidence counting;

(iii) The standardization of radionuclides emitting gamma-gamma cascades by gamma-gamma coincidence counting;

and the following methods are at present being investigated:

(iv) The standardization of beta and gamma emitting radionuclides by means of beta-gamma coincidence counting, using liquid scintillators (beta rays) and crystal scintillators (gamma rays); and

(v) The standardization of radionuclides by a microcalorimetric method;

(b) Participation in a number of inter-laboratory comparisons of radionuclides (phosphorus-32, sodium-24 and gold-198) organized by ICRU and IBWM, for the purpose of calibrating reference sources;

(c) Distribution of calibrated solutions of phosphorus-32 and iodine-131 to different laboratories in order to compare the measurement methods used. Seventeen national laboratories in the following countries participated in the inter-comparison of iodine-131: Austria, Canada, the Czechoslovak Socialist Republic, Denmark, France, the Federal Republic of Germany, Italy, the Netherlands, Poland, Sweden, the United Kingdom, the United States, and Yugoslavia; and

(d) The design of a standardizing instrument to measure absorbed radiation doses using a calorimetric method.

5. Hydrology

128. During the period under review the Agency also began a world-wide survey to determine the concentration of hydrogen and oxygen isotopes in natural water. With the help of WMO, monthly sampling of rainfall from various parts of the world has been started. A number of national laboratories are co-operating with the Agency in the measurements of these samples. The information obtained from the survey is expected to provide essential knowledge of background radioactivity which will be later needed for detailed hydrological experiments in a particular area. Such experiments and surveys may be of particular importance in arid zones in the less-developed areas; for instance, for determining the storage time of ground water and its movement under the earth, and for dealing with river control problems which arise in new or existing irrigation works, such as the measurement of the movement of river beds. The Agency has already studied some of these hydrologican problems. It is now engaged in hydrological studies in Greece, in connection with the Special Fund Irrigation Project which FAO is carrying out in that country.

129. A Symposium on the Detection and Use of Tritium in the Physical and Biological Sciences was held in Vienna in May 1961 in co-operation with the Joint Commission on Applied Radioactivity (of ICSU). Papers were presented on the various methods used to detect and count tritium and prepare compounds labeled with tritium, and on the applications of tritium in physics and chemistry. One session was devoted to the distribution of tritium in the natural environment, methods of its enrichment and its applications in hydrology. Also covered at the symposium were the synthesis of tritiated biological compounds, radiation effects of tritium and the use of tritiated compounds in radiobiology and in metabolic studies.

C. Protection against radiation

130. The Agency has continued to work on a very wide range of subjects connected with protection against radiation, in order to fulfill its statutory functions of establishing or adopting standards of safety for protection of health and the minimization of danger to life and property. In setting up these standards it is necessary to fill, by the promotion of research, the wide gaps in knowledge about the effects of radiation to which the reports of UNSCEAR have drawn attention. The Agency has concentrated in research on various subjects related to radiobiology, problems connected with the pollution of the sea by radioactive waste, and radiation dosimetry. Attention has also been given to problems of the pollution of fresh water, to the safety aspects of nuclear propulsion, and to questions of legal liability arising in the event of nuclear accidents. As the safety standards are formulated, they become in turn the basis for regulations, manuals and codes of practice which will eventually cover all aspects of nuclear technology, while taking account of its rapid evolution.

131. In planning research and in preparing regulations and manuals, the Agency continues to rely on panels of experts drawn from widely distributed geographical areas, for which the working papers are normally prepared by the Agency's Secretariat. Other interested organizations within and without the United Nations family are invited to participate on matters within their competence. In the case of regulations and other legal instruments, the work of the panels is eventually circulated to Governments and in appropriate instances submitted to the Board and the General Conference.

1. Research on radiation effects

132. Research under this heading has continued to account for a substantial proportion of the research contracts. The Agency has continued to co-operate with UNSCEAR, ICRP and ICRU, and to pay special attention to the support of research on fundamental radiobiology, pursuant to the request of the General Assembly in its resolution 1376 (XIV).

133. Twelve research contracts in radiobiology were renewed with institutes in Finland, France, Italy, the Netherlands, Norway, Poland, Sweden, Switzerland and the United Kingdom, and 13 new contracts were granted to institutes in Australia, Belgium, Brazil, Chile, the Federal Republic of Germany, Hungary, India, Italy, Spain, the United Arab Republic and the United Kingdom.

134. These contracts are concerned with three major problems of interest. One group of contracts includes studies of the mechanism of primary radiation damage at the cellular and sub-cellular level. In particular, the effects of radiation on various essential biological functions are being studied, such as enzyme systems, fatty acid metabolism, the metabolism of nucleic acids and the transport mechanisms of the cell membrane. The second group comprises investigations of radiation effects on genetic material, which will assist in evaluating the hazards and possible delayed consequences of exposure to ionizing radiation. The third group is concerned with fundamental research on problems of food sterilization through radiation and the determination of factors at present preventing the widespread application of large radiation sources to sterilize food.

135. In order to correlate as closely as possible the Agency's research contract program in radiobiology, a Study Group on Co-ordination of Research Contracts on Selected Topics in Radiobiology met in Vienna in March 1961. The participants discussed problems of radiation damage to cells connected with the enzyme release hypothesis and the modification of the permeability of cell membranes. Results of work done under Agency research contracts were discussed under the following headings: the treatment of acute radiation injury through grafting bone marrow or equivalent tissue; food preservation through combining heat treatment and low-level radiation; the production of poliomyelitis vaccine through the use of a combination of radiation and chemical agents; and the production of useful mutations in plants.

136. Six research contracts on health physics and radiation protection were renewed with institutes in Austria, the Czechoslovak Socialist Republic, France, the Netherlands, Switzerland and Yugoslavia, and ten new contracts were granted to institutes in Austria, Belgium, Denmark, France, Poland, South Africa and the United Kingdom.

137. Of the three topics within this group which have been recognized as deserving support by the Agency, one is concerned with research into the effectiveness of chemical compounds to protect radiation workers against the effects of accidental exposure to radiation. Research is carried out on various living organisms such as plants, bacteria and experimental animals. The second is closely related and is concerned with new ways of treating radiation workers who have been exposed to lethal amounts of radiation through the transference of human bone marrow from healthy donors. The third topic is the practical application of the isotope calcium-47 in various metabolic studies, the results of which are expected to lead to a better insight into bone metabolism.

138. Various methods of counting calcium-47 have been compared experimentally. The results of this study have been distributed to research contractors working with this isotope, and they will also be published in scientific journals.

139. As part of the Agency's program to obtain more information on the toxicity of biologically important radionuclides, a study has been made on bone-seeking isotopes. A panel of experts, on which the United Nations, FAO and WHO were represented, was convened in Vienna in October 1960 to advise on the Agency's strontium-90 program. The panel recommended certain research on strontium-90 chronic toxicity. As a result, the Agency is supporting research projects in which groups of persons occupationally contaminated with strontium-90 are being thoroughly investigated in order to determine metabolic behavior of strontium-90 in humans. It is planned to extend the studies and to establish a central register of all accessible cases. This will make possible a correlation between the level of strontium-90 contamination and the biological effects.

140. A Symposium on Initial Effects of Ionizing Radiations on Living Cells was organized by the Academy of Sciences of the Soviet Union and co-sponsored by the Agency and UNESCO in Moscow in October 1960. The papers presented concerned the current trends in fundamental research in radiobiology, with particular emphasis on the initial steps in the chain of reactions at the cellular and sub-cellular level, produced by exposure to ionizing radiations.

141. A Symposium on the Effects of Ionizing Radiation on the Nervous System was held in Vienna in June 1961. The main subject treated was the central nervous system, as knowledge of its reaction to irradiation may provide additional criteria for radiation safety codes in assessing radiation risks for the individual. Particular emphasis was laid on the great radiosensitivity of the higher brain functions and the morphological development of the embryonic central nervous system.

142. A Scientific Meeting on the Diagnosis and Treatment of Acute Radiation Injury was jointly organized by the Agency and WHO at Geneva in October 1960. The papers presented, together with the informal discussions, produced a very satisfactory review of the present status of understanding of radiation injury. The full proceedings are being published.

143. The Agency awarded 47 fellowships in health physics and 31 in the application of radioisotopes in biology under the 1960 fellowship program.

144. So far the provision of 19 technical assistance experts by the Agency has been approved under the regular program and under EPTA in health physics, radiation dosimetry, radiobiology and toxicology of radioactive materials.

145. Members of the technical staff paid short-term visits to a group of Member States in the Far East and the Sudan, to give advice on problems of radiation protection, particularly those connected with the establishment of new nuclear installations, and to help prepare the Agency's technical assistance programs in health physics in these areas.

2. The effect of radioactivity on the environment

146. Nine research contracts on the safe disposal of radioactive waste were renewed with institutes in Argentina, Austria, Italy, Japan and Norway and 11 new contracts were granted to institutes in Australia, the Czechoslovak Socialist Republic, Italy, Japan, the United Arab Republic and the United States. The contracts are either concerned with research on the analysis of present radioactive contamination of the biosphere or with methods of the safe disposal of radioactive waste into the sea, fresh water or the soil.

147. The problems connected with the effects of radioactivity in the sea are of concern to several organizations interested in oceanographic research and the marine sciences. The Agency is a member of the ACC sub-committee on oceanography and is working in co-operation with the other members and with interested organizations outside the United Nations family such as SCOR. The Agency's panel of experts on radioactive waste had emphasized that the Agency should continue to study the prevention of radioactive pollution of the sea, a view which was also held by the Inter-Governmental Conference on Oceanographic Research which was held in Copenhagen in July 1960, under the auspices of UNESCO.

148. An agreement has been made with the Government of Monaco and the Institute of Oceanography in Monaco for a three-year joint research program on the effects of radioactivity in the sea. [36] It is the intention, as far as possible, to study the marine environment as a whole. To date, most experiments have been designed to investigate only one segment of the environment at a time and one level of a food chain at a time. At Monaco it is proposed to carry out a different form of experiment. Certain isotopes will be introduced into a controlled environment, and the movement through each level in the food chain will be simultaneously measured. A group of experts has been appointed to help plan, advise and evaluate this program. Its first meeting was held in April 1961.

149. A panel of experts met in April 1961 to study methods of monitoring of waste disposal into the sea. This panel also considered the question of standardization of sampling and analysis of radionuclides in sea water and marine products.

150. A panel is studying the problems associated with the disposal of radioactive waste into fresh water. The first two meetings of this panel were held in November-December 1960, and May 1961, and it is expected that a third meeting, in 1961, will be necessary to complete the study.

151. Another panel held its first meeting in March 1961 in connection with the preparation of a manual on low-level waste disposal techniques. These techniques will be specially applicable to laboratories and other establishments where radioisotopes are used on a limited scale. The work of this panel is expected to extend into 1962.

152. At the request of UNSCEAR a series of papers on waste disposal were presented by members of the Agency's staff at UNSCEAR's ninth session held in Geneva in March 1961. The papers, which covered the origin and nature of radioactive wastes, present and future procedures for their disposal and environmental consequences of radioactive waste disposal, will be used as a basis for a chapter on waste disposal in UNSCEAR's comprehensive report which will be issued in 1962.

3. Conferences dealing with radiation protection

153. In view of its concern with problems of water pollution, the Agency, together with FAO and WHO, co-sponsored the Conference on Water Pollution Problems in Europe, which was convened by ECE in Geneva in February 1961. The most urgent legal, administrative, technical and health aspects of the subject were discussed and consideration was given to possible forms of international action in this field.

154. Attention has been given to emerging questions of safety arising from the advent of nuclear propelled ships, and a symposium was held in co-operation with IMCO at Taormina, Italy, in November 1960 on Nuclear Ship Propulsion, with Special Reference to Nuclear Safety. The economic, technological and operational aspects of ship reactors were discussed. Papers were presented dealing with the safety of different types of reactors, reactor control and instrumentation, the testing of reactor components, and problems arising from the entry into harbors of nuclear propelled ships.

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[36] See document INFCIRC/27.

4. Radiation protection measures and laboratory work

155. Part of the work of the Agency's laboratory has been referred to in paragraphs 126 and 127 above. Its second main activity has been the measurement of the radioactive contamination of the environment (vegetation, soils, water) and of foods, essential for the protection of health.

156. Approximately 300 food samples, originating from various countries (Austria, the Federal Republic of Germany, Indonesia, Pakistan, the Philippines, Poland, Switzerland, Turkey and the United States) have been analyzed. Eighty per cent of these have been milk samples and 20 per cent other foods, such as vegetables, fruit, cereals, potatoes and meat. The samples have been analyzed in order to ascertain total beta activity and strontium-90 and cesium-137 contamination. Furthermore, air samples have been analyzed for their total beta activity, as well as water samples for contamination of strontium-89, strontium-90, cesium-137, barium-140 and cerium-144.

157. At the request of the Turkish Government, the Agency's laboratory has carried out analyses of some 50 samples of soil and vegetation, originating from the site of the Istanbul reactor.

158. Within the program mentioned above and at the request of the Austrian authorities the laboratory is carrying out a continuing survey of the radioactive contamination of the most important foodstuffs in Austria (milk, vegetables, fruit, etc.). Two reports on this survey have been transmitted to the Austrian Government and copies sent to UNSCEAR: the first report was mainly concerned with the selection of samples, taking into account regional climatic differences and the relative importance of individual items of food for the diet as a whole, including calcium; the second was on results obtained during the first half year period of the survey (June to December 1960). A copy of the latter was sent to FAO for inclusion in a publication on strontium-90 levels in food.

159. Theoretical studies were made on the movement of radioactive nuclides in the food chain in the stages between environmental contamination and human consumption. Some results of these studies have been published. [37]

160. Plans are being made for the laboratory to provide a bio-assay service for Member States. Under this service radiochemical analyses of specimens of human excreta or other biological material will be carried out, in order to give an indication of the level of internal radioactive contamination.

161. Other radiochemical laboratory work included the determination of uranium in ores, in response to a request made by Colombia, and the dating of a uranium thorianite sample requested by Burma.

162. Seven fellows from Austria, Indonesia, the Philippines, Poland and the United Arab Republic were trained in the Agency's laboratory in the methods of analyzing environmental contamination.

163. The Agency has also undertaken a number of special projects for the evaluation of the safety of new reactors at the request of Member States. Thus the hazards of the high flux reactor being constructed at Petten in the Netherlands have been evaluated by a team of experts. Following the evaluation of the Swiss Diorit reactor, in 1960, a preliminary reactor safety report has been prepared concerning the Swiss Enusa reactor. In addition, experts from the Agency's staff assisted the Yugoslav Government in selecting a site for a research reactor.

164. The Agency is also studying several problems of reactor siting and is contributing to the work being done on this subject by ISO. A new subject of work is the evaluation of ports and harbors with respect to the safe handling of nuclear merchant ships. The problems being examined include methods of evaluation and methods of interpreting the results of such evaluation.

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[37] Nature, Vol. 189, p. 806 (1961).

5. Emergency assistance

165. The Agency is also considering what part it can play in arrangements to enable help to be given in the event of a nuclear accident in the territory of a Member State. [38] Although the leading nuclear countries may be able to deal with such incidents from their own resources, an accident might cause problems of extreme urgency in a country in the less-developed areas, which cannot economically maintain all the necessary services for dealing with such an eventuality. Such problems may be especially grave in countries remote from large existing nuclear installations. The role of the Agency in this system would be mainly that of an intermediary. It could act as a clearing house for information on the facilities and expert knowledge which might be made available by participating Member States. It is envisaged, however, that in certain circumstances the Agency might participate in the organization of the assistance or might itself supply certain categories of assistance. It is preparing standard terms and conditions which might be used as a basis for bilateral agreements if a State on whose territory an accident occurred requested help from another participating Member State. The Agency is collecting information supplied by Member States on accidents involving radiation hazards which have occurred. The information sought covers the nature and consequences of the accidents, the possible causes, the methods adopted in dealing with the resulting emergency situation and estimates of the radiation doses received by personnel. Similarly a survey of reactor incidents is being compiled to serve as a basis for studies of experience on weaknesses in present reactor safety precautions.

6. Regulatory and legal work

(a) Basic safety measures and standards

166. The establishment of basic safety standards for application to Agency operations and assisted operations was studied by a panel of experts which met in November 1960, after which draft provisional standards were circulated for comment to Member States. These comments will be considered by the panel when it meets again in June 1961. This method of preparation is designed to ensure that the basic safety standards will not be inconsistent with existing national and regional standards and may also provide guidance to those Member States who have not yet drawn up national health and safety regulations connected with the peaceful uses of atomic energy. It is expected that before the end of 1961 draft basic safety standards can be considered by the Board.

(b) Transport regulations

167. The draft regulations prepared by two panels of experts convened to formulate regulations for the safe transport of radioactive materials were approved by the Board in September 1960.

168. In approving these regulations the Board authorized the Director General to apply them to Agency operations or assisted operations, and to recommend to Member States and organizations concerned, that they be taken as a basis in relevant national regulations and be applied to international transport. The Board asked that Member States and organizations should be invited to notify the Agency after a specific period of the extent to which they were applying the regulations and why they were sometimes obliged to depart from them. The Director General has since asked that this information be provided to the Agency by September 1962.

(c) Codes of practice

169. Health physics and medical addenda dealing with technical aspects of the procedures recommended in the manual on Safe Handling of Radioisotopes were published as the second and third volumes in the Safety Series. Certain sections of the manual were revised to make them conform with the latest recommendations of ICRP. A manual on the use of film

[38] See resolution GC(IV)/RES/73, paragraph 3.

badges for personnel monitoring has been prepared. This will provide detailed guidance on the use of film monitoring techniques for the control of the radiation dose received by personnel exposed to radiation in the course of their work.

(d) Control of waste disposal

170. A panel of legal experts attended by representatives of international organizations met in January 1961 to consider the organizational, administrative and legal measures which might be taken at an international level to implement the conclusions reached by the panel that had met earlier to discuss the matter of radioactive waste disposal into the sea. After a preliminary discussion of the problems involved, the panel issued a report setting forth the various views of the participants and indicating certain technical matters that should be studied in preparation for the further work of the panel.

(e) Civil liability

171. As previously reported [39], a panel of legal experts met in 1959 to advise the Director General on action that might be desirable in the field of civil liability and State responsibility for non-military nuclear hazards. In February 1960 the panel submitted to the Director General a report to which was annexed a draft Convention on Minimum International Standards Regarding Civil Liability for Nuclear Damage, as well as an article-by-article commentary thereon. As authorized by the Board, the Director General circulated these documents to all Member States with a request for their comments.

172. In January 1961 the Board constituted a committee of Government representatives from 14 States to consider the draft convention and the comments received from Member States, and on the basis of these documents to prepare a draft International Convention on Minimum International Standards Regarding Civil Liability for Nuclear Damage. This committee met in Vienna from 3 to 13 May 1961 and, in accordance with the mandate received by the Board, duly prepared a text of a revised draft convention.

173. In April 1961 the Belgian Government convened the eleventh session of the Diplomatic Conference on Maritime Law which was co-sponsored by the Agency in so far as it concerned the liability of operators of nuclear ships.

174. After considering alternative draft conventions on the liability of operators of nuclear ships, one drawn up by the International Maritime Committee and the other drawn up by the Agency on the basis of the report and recommendations of the panel of experts which met in Vienna in March and August 1960, the Conference reached agreement on all but two of the substantive Articles of a convention. In order to prepare the final text of a convention the Conference set up a Standing Committee to study further the Articles already adopted, the two remaining Articles and the final clauses. The Conference also recommended that the Government of Belgium and the Agency should convene, at the earliest possible date, an ad hoc diplomatic conference for the final drafting and conclusion of a convention.

[39] See document GC(IV)/114, paragraphs 259-263.

CHAPTER III. THE MAIN PROGRAMS

A. Technical assistance

175. The Agency's technical assistance activities include the provision of experts, equipment and supplies, fellowships, exchange professors, training courses and the use of the Agency's two mobile radioisotope laboratories. In planning and implementing the technical assistance program, efforts are made to ensure that the individual components of the program supplement each other.

176. In the second year of its operational program, the Agency's technical assistance activities have continued to benefit from consultations with the United Nations and the specialized agencies, from participation in EPTA and from services rendered by TAB representatives in the field. Not only the Agency's program financed under EPTA, but also its regular program and its preliminary assistance missions were considerably assisted by early consultations and the co-operation and advice received.

177. The co-ordination thus achieved has been noted by ACC in its twenty-fourth report to ECOSOC [40] where it is stated that "as far as assistance under EPTA is concerned, well established procedures for co-ordination already exist in respect of all projects including those involving the peaceful uses of atomic energy".

178. The resources at the disposal of the Agency for carrying out its technical assistance programs are of three kinds, namely:

(i) Voluntary financial contributions to the Agency's General Fund;

(ii) Donations in kind, including the services of experts, fellowships and scholarships at national institutions of Member States, and equipment; and

(iii) Funds made available to the Agency, as a result of its participation in EPTA.

179. By 30 June 1961, the amounts that had been pledged and paid to the Agency's General Fund for 1960 and 1961 were as follows:

Year	Target set	Amount pledged	Amount paid
	$	$	$
1960	1 500 000	996 103	995 368
1961	1 800 000	1 181 372	823 715

Detailed statements of pledges and payments for 1960 and 1961 are given in Annex VIII. As a result of the shortfall in reaching the target figures for the Agency's General Fund, the funds which could be made available for the Agency's technical assistance activities in 1960 and 1961 were considerably less than in the budget estimates for these years.

180. Thus for 1960 the Agency's budget included an amount of $1 367 000 for technical assistance activities to be financed from the Agency's own resources. The actual expenditures and obligations including earmarkings, made possible on the basis of the funds available, amounted to $1 044 702, or about 76 per cent of the amount foreseen in the budget; in addition, equipment in kind, valued at $192 000, was provided by one Member State. In 1961 the shortfall in voluntary contributions has compelled the Board to reduce the allocations to approximately 60 per cent of what was foreseen in the budget for this year. There is little prospect that funds will be available to carry out more than about two-thirds of the approved programs of technical assistance for 1961.

[40] United Nations document E/3368, Annex I, paragraph 6.

181. The General Assembly of the United Nations has noted the inadequate financial basis for the Agency's technical assistance program and on 15 December 1960 it adopted resolution 1531(XV), inviting increases in voluntary contributions to the Agency's General Fund.

182. The donations in kind in the form of fellowships, scholarships and offers of the services of experts in 1960 and 1961 cover many aspects of the peaceful uses of atomic energy. Offers of Type II fellowships for 1960 and 1961, i.e. fellowships financed by Governments of Member States, are listed in Annex IX, and the offers of experts are shown in Annex X. In addition to these contributions and those, reported elsewhere, to the Agency's General Fund, full use was made of the offer by the United States, referred to in last year's report [41], of equipment for technical assistance projects up to a value of $200 000.

183. In 1960 the amounts spent by the Agency for technical assistance financed from EPTA funds were:

For experts	$203 010
For fellowships	$305 899
For equipment	$ 83 462
Total	$592 371

The EPTA financed program for 1961-62 as approved by the Technical Assistance Committee of ECOSOC amounts to $1 483 500, of which $110 150 are set aside to meet requests for projects of a regional character; 38 countries will receive assistance from the Agency (14 more than in 1960) of which three are newly independent countries in Africa. This amount excludes the Agency programs amounting to $89 900 which are provided under the supplementary program for Africa in accordance with ECOSOC resolution 768 (XXX).

184. In addition to the customary forms of technical assistance given by the United Nations family (services of experts, fellowships, exchange and training and limited quantities of equipment), members of the Agency's staff have provided technical advice, either in consultations at headquarters or by short missions to Member States. The subjects on which the Agency generally gives advice or technical assistance were described in last year's report [42]. The following paragraphs give a brief survey of the assistance given in the period under review.

1. Preliminary surveys

185. When the Agency began its operations in 1958, many of its Member States were at an early stage in the development of their programs for the peaceful uses of atomic energy and in some instances planning had not yet begun. Since the provision of technical assistance on a large scale often requires a considerable amount of preparatory work both by the requesting State and by the Agency, two of the Agency's early and continuing activities have been to dispatch preliminary assistance missions and to make preparatory surveys.

186. The missions and surveys undertaken in 1958 and 1959 were described in the reports to the General Conference for 1958-59 and 1959-60 [43]. In 1960 a preliminary assistance mission visited Greece, the Ivory Coast, the then Federation of Mali, Morocco, Sudan and Tunisia. Another mission of this kind went to El Salvador, Guatemala, Mexico, Paraguay and Peru. The missions studied the needs of the countries concerned with regard to the organization of atomic energy activities; education and training; reactor programs; radiochemistry; applications of radioisotopes in agriculture and medicine; health physics; power and energy; and prospecting, mining and processing of nuclear raw materials. In addition, smaller missions, composed of two or three members, have been sent to Member

[41] GC(IV)/114, paragraph 103.

[42] Ibid., paragraph 106.

[43] GC(III)/73, paragraphs 122 and 123, and GC(IV)/114, paragraphs 109 and 110.

States in connection with specific technical assistance requests. The recommendations of these various missions are being implemented by appropriate action under the Agency's technical assistance (including fellowships), research contract and other technical programs, as well as by the Governments concerned. It is planned to send in 1961 two missions to visit about ten countries in Africa and Latin America.

2. The provision of experts and equipment

187. Requests to the Agency for technical assistance under this heading come from countries at all stages of development but the greater number are from the less-developed countries. The requests have continued to become more numerous and more varied and in fact now considerably exceed the Agency's means to meet them. The Board has recognized that specialized equipment is of particular importance in carrying out nuclear energy projects. Technical assistance requests to the Agency, especially from less-developed countries embarking on atomic energy programs which are confronted with substantial investments in foreign currencies, are often accompanied by requests for such equipment. Accordingly, the Board has decided that the general practice for the provision of equipment and supplies under EPTA should be followed in a flexible manner with regard to projects under the Agency's program. Information about experts and equipment provided on the basis of the Agency's own resources and financed from EPTA is given in the tables in paragraph 200.

3. Training and exchange

188. The lack of scientific and technical personnel possessing the necessary qualifications is one of the main reasons why in many parts of the world progress is slow in the peaceful uses of atomic energy. For this reason one of the important forms of assistance given by the Agency to Member States is in training students and in the exchange of scientists and experts. The growth of this program has emphasized the requirements of Member States and illustrated the Agency's capacity to meet them.

(a) Fellowships

189. Agency fellowships cover three kinds of training: general techniques training, specialist training and research training.

190. The growth of the fellowship program since its inception in 1958 can be seen from the table below.

Program year	Nominations received	Selected for awards	Withdrawals	Fellowships completed	Fellows studying	Fellows being placed[a/]
1958	287	219	58	140	21	-
1959	577	380	75	171	115	19
1960	648	468	49	20	212	187
Total	1 512	1 067[b/]	182	331	348	206

a/ As there has often been considerable difficulty in placing candidates after selection, the Board has requested the Secretariat to study the reasons for the delays incurred.

b/ The number of fellowships taken up in 1960 was 429, and the total for the triennium was 983.

191. Of the 1 067 candidates [44] selected for awards, 169 were awarded fellowships under EPTA. Details of institutions where research and training fellowships have been awarded

[44] See also paragraph 182 above.

or are available have been issued in the Agency's publication Assistance through Fellowship and Exchange Programme in Nuclear Science (GEN/PUB/9). Since the publication was issued in December 1960, the Agency has been informed of additional openings for Type I research and training fellowships, i.e. fellowships financed from Operating Fund II or under EPTA, in the Federal Republic of Germany, Norway, Sweden, the United Kingdom (Radiation Laboratory, Wantage) and Venezuela (Venezuelan Institute of Scientific Research, Caracas).

192. The distribution of fellowships in the years 1958, 1959 and 1960 between various subjects of study is shown in the following table:

Subjects of study	Nominations received	Fellowships completed and fellows studying
Application of radioisotopes and radiation	468	138
Chemistry[a/]	165	73
Geology[b/]	68	14
Health physics	140	51
Nuclear chemical engineering	67	11
Physics[c/]	264	96
Reactor engineering	329	116
Miscellaneous	11	10
Totals	1 512	509

a/ For example analytical, "hot" and radiochemistry.
b/ For example nuclear raw materials.
c/ For example nuclear, neutron and theoretical.

193. By 30 June 1961, 605 nominations had been received from 44 countries and 242 candidates had been selected for awards under the 1961 program.

(b) Exchange of scientists

194. At the request of Member States, the Agency arranges for visiting professors or scientists to go to their countries to lecture, organize courses, improve the curriculum of educational establishments or initiate research projects. This enables the Agency to lend effective assistance to less-developed countries in the training of nuclear scientists and also provides an opportunity for the selection and preparation of suitable students as candidates for further training under the fellowship program.

195. Under the 1960 exchange program 17 visiting professors were sent to various countries by the Agency, including one scientist whose contract had been extended. By 30 June eight had been appointed for assignments under the 1961 program.

(c) Training courses

196. The following training courses were arranged by the Agency during the period under review: a regional training course in radioisotope techniques, held in Cairo, United Arab Republic, from 20 March to 20 May 1961; an international training course on radioisotope techniques in soil-plant aspects of agricultural and forestry research, which was jointly sponsored with FAO in Wageningen, Netherlands, from 4 April to 26 May.

197. The established practice for such training courses is that the host Government makes available its laboratory facilities and teaching staff, while the Agency assists in the preparation of the courses and provides visiting professors and scientists. When the topic is of interest to other organizations within the United Nations system, joint sponsorship is arranged where possible.

198. As a result of the receipt of requests from Greece and Turkey to assist those Member States in setting up regional training centers the Board decided that it would consider the desirability of establishing these centers, after experience had been gained through the holding of training courses. [45]

199. The Agency's two mobile radioisotope laboratories are used for training in general radioisotope techniques, especially in their agricultural, medical and chemical applications. In 1960 one mobile laboratory was used in Latin America. Eight courses were held in various cities in Mexico between January and April 1960 with 141 students participating, and in Argentina 35 students participated in three courses, held between June and October. The other mobile laboratory has been in the Far East where it was used for courses in four cities in the Republic of Korea between April and September 1960, attended by 177 students. Later the laboratory moved to China (Taiwan) where courses in three universities or institutes were organized between October 1960 and March 1961. After three months in the Philippines it will go on to Indonesia from July to November 1961.

200. The Agency's assistance in providing experts, equipment, fellowships, visiting professors and training courses, and the use of the Agency's mobile radioisotope laboratories, as described in paragraphs 187-199 above, is summarized in the following tables:

(i) Number of experts, fellowships and visiting professors under the 1960 and 1961 programs

	Experts		Fellowships		Visiting professors	
	Numbers	Man months	Numbers	Man months	Numbers	Man months
1960						
Regular program (Agency financed)	18[a]	73.5	344	4 340	17[b]	106
EPTA	22	100.5	85	785	-	-
TOTAL	40	174	429	5 125	17[b]	106
1961						
Regular program (Agency financed)	28	222	240[c]	2 500[c]	20[d]	110[d]
EPTA	67	376	51	586	-	-
TOTAL	95	598	291	3 086	20[d]	110[d]

a/ This figure represents the number of experts actually in the field during 1960 under the Regular Program.
b/ Including one extension.
c/ Estimated figures of fellowships financed by both the Agency and host countries from the allocation of funds available at 31 March 1961.
d/ Estimate.

[45] See also last year's report, GC(IV)/114, paragraph 132.

(ii) Approved cost of the experts, fellowships, visiting professors, training courses, mobile laboratories and equipment

	Experts	Fellowships	Visiting professors	Training courses	Mobile laboratories	Equipment
	$	$	$	$	$	$
1960						
Regular program (Agency financed)	298 339[a]	529 003	95 578	7 735	28 948	85 100[d]
EPTA	203 010[b]	305 899	-	-	-	83 462
TOTAL	501 349	834 902[c]	95 578	7 735	28 948	168 562
1961						
Regular program (Agency financed)	321 900[e, f]	650 000[f]	90 000[f]	60 000[f]	51 000[f]	191 200[e, f]
EPTA	530 380[g]	182 700[h]	-	[i]	-	102 100[j]
TOTAL	852 280	832 700	90 000	60 000	51 000	293 300

a/ This figure represents the cost of experts whose provision was approved by the Board in 1960 in connection with technical assistance projects; the implementation of some of these projects continues in 1961. The actual expenditure on experts in the field in 1960 amounted to $97 105.

b/ This figure shows the total cost of experts in the field in 1960 on Agency projects under EPTA.

c/ This figure represents the total expenditures and obligations under the 1960 Regular and EPTA fellowship programs. It does not include the cost of fellowships provided to the Agency free of cost and estimated by the Secretariat at approximately $733 000.

d/ This figure represents the value of equipment, the provision of which was approved by the Board in 1960 in connection with technical assistance projects; the implementation of some of these projects continues in 1961. The actual expenditure on equipment in 1960 amounted to $39 423. In addition, equipment in kind in the total value of $192 000 was provided by the United States.

e/ These figures relate to the program approved for implementation from 1961 resources, subject to availability of funds.

f/ These figures are based on the assumption that the target for voluntary contributions will be reached. The actual allotment so far has been:

- for experts and equipment $310 000
- for fellowships, visiting professors and training courses $490 000
- for mobile radioisotope laboratories 35 000

g/ The figure $530 380 includes $26 800 for experts for regional projects (training courses).

h/ The figure $182 700 includes $15 200 for fellowships for regional projects (training courses).

i/ See also notes g, h and j: the total for the Agency's regional projects (training courses) under EPTA in 1961 amounts to $62 000.

j/ The figure $102 100 includes $20 000 for equipment for regional projects (training courses).

B. Exchange of information

201. The Agency's work in the collection, exchange and distribution of information on the peaceful uses of atomic energy has progressed considerably; it has mainly taken the form of the organization of meetings, the publication of books, brochures and periodicals, nuclear documentation and library services.

1. Scientific meetings

202. Scientific conferences, symposia and seminars are an important means of exchanging information. During the period under review the Agency organized 13 such meetings on different subjects. Some of these were held outside Austria, at the invitation of Member States. This had the advantage of bringing the activities of the Agency to the attention of a wider public and promoting wider international participation. Some were organized in co-operation with certain specialized agencies, when the subject matter was of common interest.

203. The meetings which were organized by the Agency during the period under review were attended by 2 327 participants from 58 Member States and 18 international organizations. 762 papers were presented on various topics by scientists from 41 Member States and 11 international organizations. The proceedings of the meetings are being published for distribution to Member States. A list of conferences, seminars and symposia held in 1960 and those planned for 1961 is given in Annex XI. A list of panels of experts convened during the period under review is given in Annex XII.

2. Scientific publications

204. A number of scientific publications of the Agency, such as the directories and manuals, compiled with the assistance of panels of experts, have been referred to earlier in this report in connection with the technical subjects with which they deal. In the Safety Series five new publications were issued, and many Member States have already taken note of the recommendations made in these manuals. Several publications were issued in the Bibliographic Series, and twelve in the Review Series.

205. Publication of a scientific journal, Nuclear Fusion: Journal of Plasma Physics and Thermonuclear Fusion, began in October 1960 and two issues have so far been issued. Scientists from ten different nations have contributed reports on controlled fusion research for the journal.

206. A third volume of the Directory of Nuclear Reactors was published, which contains detailed information on 96 research, test and experimental reactors at present in operation or under construction in 21 countries. Other publications include further sections of the World List of Institutions concerned with Atomic Energy, the second issue of the List of Bibliographies on Nuclear Energy, and the first issue of the List of Periodicals in the Field of Nuclear Energy. In addition, a number of panel reports, technical reports and other documentary material have been published. A chart of publications issued during the period under review is given in Annex XIII. This classifies publications according to category and subject matter.

207. In carrying out this program approximately 13 000 pages of manuscript have been prepared for publication and the average number of copies printed was 3 000. Of these, approximately one-third was distributed free of charge to the Governments of Member States, to the members of SAC, the United Nations, the specialized agencies, other international organizations, depository libraries in Member States, the technical press and exchange centers. The remainder is put on sale through agents.

208. On 30 June 1961 the total amount credited to the Publications Revolving Fund, which was established in accordance with resolution GC(III)/RES/53, was $29 530.

3. Scientific documentation

209. Scientific and technical literature received from Member States and international organizations has been scanned and classified and twice a month a list of references on nuclear energy has been issued. A uniform decimal classification system on nuclear energy is being set up.

210. As first steps towards implementing General Conference resolution GC(IV)/RES/78 on the exchange of scientific abstracts, a list of periodicals dealing with nuclear energy and a general survey of abstracting services and abstracting periodicals in nuclear science are being prepared.

211. Contacts are being established with institutions engaged in this work for the purpose of filling in gaps in the existing abstracting literature. To achieve general co-ordination of abstracting activities on an international scale, consultations are in progress with UNESCO and other organizations concerned. The Agency's photographic reproduction facilities are being improved with a view to providing, on request, copies of abstracts.

212. In October 1960 an Advisory Panel on the Dissemination of Scientific and Technical Information in the Field of Nuclear Energy met at the Agency's Headquarters to discuss various aspects of the distribution of scientific and technical information. It made several recommendations for facilitating documentation work and organizing international exchange.

4. The library

213. In the three years of its operation the library has become an important source of technical information. It now has over 49 000 scientific and technical publications and the number of scientists using it as a source of reference is growing continuously. The installation of up-to-date photographic equipment has increased the speed with which copies of documents and scientific articles can be supplied.

5. Special project

214. Pursuant to General Conference resolution GC(IV)/RES/76 the Agency has undertaken a study, in consultation with appropriate international organizations, on the various aspects of the question of establishing an international center for theoretical physics. The Agency has also convened a panel consisting of eminent theoretical physicists and of representatives of interested international organizations. The findings of the panel have been submitted to SAC whose recommendations on this matter are under consideration.

6. Public information

215. Five issues of the Agency's bulletin were published in the period under review and approximately 7 000 copies of each issue were distributed. A newsletter for the scientific and technical press has been initiated and the first three issues have been distributed and were well received.

216. The weekly *Digest of Atomic News*, in which items are reproduced from leading newspapers and magazines and from press releases issued by other international organizations and atomic energy authorities, is now in its third year.

217. A monthly summary of Agency news is being distributed to all United Nations Information Centers. Press releases and still photographs were distributed as a routine activity; special articles have been prepared on request. The Agency's conferences have also received television and radio coverage.

218. The film "The International Atom", produced in co-operation with the United Nations Visual Information Board, was completed in January 1961. Prints and versions in various other languages are being prepared for distribution.

C. Research and development

219. In addition to the limited research undertaken as an adjunct to the work of its own laboratories, the Agency has continued to award research contracts to institutes throughout the world. The subjects under study include problems of radioactive waste disposal, health physics and radiation protection, radiobiology, safeguards methods, reactor studies and the application of radioisotopes to agriculture and medicine. Research contracts serve the double purpose of seeking solutions to nuclear science problems of general interest and of stimulating national scientific advancement in countries embarking on atomic energy programs.

220. During the period under review the research contract program has developed generally along the lines of the preceding year. The number of projects reviewed has greatly increased.

221. A total of 48 new contracts were awarded during the period under review and 35 contracts were renewed. $407 330 were used from the regular budget, $54 095 from the operational budget and $190 764 from funds made available by the United States to finance contracts on subjects and at institutions selected by the Agency. Similarly, $10 000 were received from the Government of the Federal Republic of Germany, of which $7 040 have so far been used to finance two technical contracts. Annex XIV contains a list of the titles of the individual new, renewed and completed research contracts, the names of the institutions engaged in the work and the amounts contributed by the Agency.

222. The following table gives a breakdown by subject matter of the research contracts awarded or renewed:

Subject matter of research	Number of contracts placed	Number of contracts renewed	Contribution from regular budget (in dollars)	Contribution from operational budget (in dollars)	Contribution from external sources (in dollars)	Total (in dollars)
Safe disposal of radioactive waste	11	9	148 435	-	16 174	164 609
Health physics and radiation protection	10	6	72 160	-	-	72 160
Radiobiology	13	12	130 325	-	66 470	196 795
Safeguards methods	2	-	47 000	-	-	47 000
Reactor studies	2	-	9 410	-	54 000	63 410
Application of radioisotopes in medicine	1	5	-	36 735	-	36 735
Application of radioisotopes in agriculture	6	3	-	17 360	33 320	50 680
Miscellaneous	3	-	-	-	20 800	20 800
Total	48	35	407 330	54 095	190 764	652 189

223. The following table shows a breakdown by countries in which the research work is being carried out:

Country	Number of contracts placed	Number of contracts renewed	Contribution from regular budget (in dollars)	Contribution from operational budget (in dollars)	Contribution from external sources (in dollars)	Total (in dollars)
Argentina	-	1	6 000	-	-	6 000
Australia	2	-	9 650	-	-	9 650
Austria	3	6	19 160	-	12 400	31 560
Belgium	2	-	9 125	-	-	9 125
Brazil	1	-	-	-	5 500	5 500
Chile	1	-	11 750	-	-	11 750
China (Taiwan)	2	-	-	4 520	6 000	10 520
Czechoslovak Socialist Republic	2	1	30 500	-	-	30 500
Denmark	1	-	950	-	-	950
Finland	-	1	-	-	9 350	9 350
France	2	3	43 980	-	-	43 980
Germany, Federal Republic of	2	-	7 800	-	8 120	15 920
Greece	-	1	-	6 200	-	6 200
Hungary	1	-	5 500	-	-	5 500
India	2	-	32 900	-	-	32 900
Iraq	-	1	-	4 800	-	4 800
Israel	1	1	9 410	10 200	-	19 610
Italy	6	2	51 500	-	55 524	107 024
Japan	2	4	18 875	7 840	-	26 715
Netherlands	-	2	21 000	-	-	21 000
Norway	1	2	25 000	-	54 000	79 000
Philippines	-	1	-	8 900	-	8 900
Poland	1	1	4 770	-	-	4 770
Portugal	1	-	-	4 000	-	4 000
South Africa	2	-	2 375	4 035	-	6 410
Spain	1	-	11 535	-	-	11 535
Sweden	-	1	-	-	10 920	10 920
Switzerland	-	2	15 370	-	-	15 370
Thailand	-	1	-	2 600	-	2 600
United Arab Republic	2	-	14 870	-	-	14 870
United Kingdom	6	2	21 150	-	13 400	34 550
United States	3	-	29 660	-	-	29 660
Yugoslavia	-	2	4 500	1 000	-	5 500
Total	48	35	407 330	54 095	190 764	652 189

224. The results of the first contracts awarded - in many cases the work requires two to three years for completion - are now becoming available, and Annex XV gives a list of references to publications reporting results of work done under these contracts. In addition, arrangements have been made to publish annually, in the four working languages of the Agency, extensive summaries of the final reports on the results of work done under research contracts completed during the preceding year. The first collection of summaries covers contracts completed up to 31 December 1960. [46]

225. The research contract program of the Agency is, as far as is known, the first of its type to be undertaken on a substantial international scale by an organization of the United Nations family. It has therefore been necessary to develop special procedures for submitting, considering and awarding contracts and, in the light of the Agency's Statute, for selecting subjects of research. In a novel program of this kind, certain initial problems have inevitably arisen, particularly with regard to the direction of research in the way best fitted to meet the needs of the less-developed areas. During its meetings in April 1961, the Board approved revised procedures for administering the research contract program which provide for measures designed to strengthen the co-operation between the Board, the Director General and SAC in determining the policy to be followed in the further development of the research contract program.

226. The Agency's experience may be of interest to specialized agencies now embarking on similar types of programs. The question of inter-agency co-ordination has not so far given rise to any serious problems, but the need for it has been kept in mind and may call for additional consultative arrangements if other agencies embark upon research contract programs in related fields. In the meantime, the Agency is keeping the United Nations and the specialized agencies informed of its research subjects.

D. Safeguards

1. Principles and procedures for the application of safeguards

227. At its meetings in January 1961 the Board considered the principles and procedures for the application of Agency safeguards which had been submitted for consideration to the General Conference at its fourth regular session. The Board made certain amendments to the document in question which was then adopted by a majority vote. The approved principles and procedures [47] relate only to research, test and power reactors with less than 100 Mw thermal output, to the source and special fissionable material used and produced in these reactors, and to small research and development facilities. Procedures covering other types of nuclear facilities will be developed as the probable need for them becomes evident.

228. The Agency received two formal joint communications - one from the Governments of Canada and Japan, the other from the Governments of Japan and the United States - proposing consultations with a view to formulating appropriate agreements for the transfer to the Agency of the administration of safeguards arising out of bilateral agreements between the Governments concerned for co-operation in the peaceful uses of atomic energy. Draft agreements to this effect will be submitted for the consideration of the Board upon the conclusion of these consultations.

229. In addition the United States Government has indicated that formal proposals will be made to the Agency in connection with its offer to place four reactors in the United States under the Agency's safeguards [48].

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[46] IAEA Research Contracts, first annual report, Technical Reports Series No. 4 (STI/DOC/10/4), the English version of which is scheduled to appear in July 1961. Versions in other languages will be published shortly thereafter.

[47] INFCIRC/26.

[48] See document GC(IV)/OR. 38, paragraph 41.

230. The principles and procedures have found initial application in the case of the supply of a research reactor and its fuel to the Government of Finland and in the case of the supply of fuel to the Norwegian Government for the joint research program with the NORA reactor. [49]

2. Control of special materials

231. During the period under review Austria, the Netherlands and Yugoslavia received advice on the establishment of adequate accountability procedures for nuclear and other special materials. The Governments of Argentina and Finland have also submitted requests for such services.

232. As a part of the program to assist Member States in this matter a manual entitled Management Control of Special Materials in Nuclear Installations was published in November 1960. This contains the principles and procedures for accountability of special materials to be followed by the Agency in its own operations. It is also intended to serve as a guide to Member States wishing to set up or extend their procedures for accounting, stock-taking, measurement and storing of nuclear materials.

3. Research on safeguards techniques

233. The research contracts program directed to improve safeguards control techniques, notably the development of techniques for the non-destructive analysis of irradiated fuel elements, has continued in the past year. Contracts have been awarded for this purpose to scientific establishments in India and Italy, and work under contracts previously granted to institutions in Belgium, France, the Federal Republic of Germany, Norway and Poland has continued.

234. Broadly, two approaches to this problem are being followed. The first is based on the different behavior of plutonium and uranium-235 under irradiation as a way of determining the amounts of each element in a specific fuel assembly. The second makes use of the effects of radiation on certain materials as a way of recording what irradiation a particular fuel element has undergone. Most of the work so far done is of a preliminary nature and conclusive results have not yet been obtained, but the progress made in the period under review has been very promising.

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[49] See also paragraphs 90 and 92 above.

ANNEX I

THE BOARD OF GOVERNORS: 1960-61

A. Member States and their Governors

To 1 October 1960	Member State 1960-1961	From 1 October 1960	Governor (30 June 1961)
		Argentina[e]	Mr. O. A. Quihillalt
	Australia[a][f]		Mr. A. D. McKnight (Chairman)
		Belgium[g]	Mr. J. Errera
	Brazil[a][f]		Professor M. D. Souza Santos
	Bulgaria[b]		Professor G. Nadjakov (Vice-Chairman)
	Canada[a][f]		Mr. M. H. Wershof
	Ceylon[b]		Mr. S. P. Wickramasinha
Czechoslovak Socialist Republic[c]			
		El Salvador[e]	Mr. E. Suàrez C.
		Finland[g]	Professor E. Laurila
	France[a][f]		Dr. B. Goldschmidt
		Germany, Federal Republic of[e]	Dr. W. Schulte-Meermann
	India[a][f]		Mr. A. S. Lall
Indonesia[d]			
		Iraq[e]	Mr. B. H. Hasani
	Japan[a][f]		Mr. F. Uchida
	Mexico[b]		Dr. C. Graef Fernandez (Vice-Chairman)
Netherlands[d]			
Norway[c]			
Peru[d]			
	Philippines[b]		Dr. R. Regala
		Poland[g]	Mr. W. Billig
Portugal[c]			
	South Africa[a][f]		Mr. D. B. Sole
	Spain[b]		Professor A. Duran Miranda
		Thailand[e]	Mr. M. M. Vejyant-Rangsrisht

To 1 October 1960	Member State 1960-1961	From 1 October 1960	Governor (30 June 1961)
	Union of Soviet Socialist Republics[a/] [f/]		Professor V. S. Emelyanov
United Arab Republic[d/]			
	United Kingdom of Great Britain and Northern Ireland[a/] [f/]		Mr. M. I. Michaels
	United States of America[a/] [f/]		Mr. H. de Wolf-Smyth
Venezuela[d/]			

a/ Designated by the Board on 26 June 1959 under Article VI. A. 1 of the Statute.

b/ Elected by the General Conference on 25 September 1959 under Article VI. A. 3 and B of the Statute.

c/ Designated by the Board on 26 June 1959 under Article VI. A. 2 of the Statute.

d/ Elected by the General Conference on 26 September 1958 under Article VI. A. 3 and B of the Statute.

e/ Elected by the General Conference on ~~20~~ 30 September 1960 under Article VI. A. 3 and B of the Statute.

f/ Designated by the Board on 20 June 1960 under Article VI. A. 1 of the Statute.

g/ Designated by the Board on 20 June 1960 under Article VI. A. 2 of the Statute.

B. Committees

Note: Each Committee is presided over by the Chairman or, in his absence or disability, one of the Vice-Chairmen of the Board.

Title	Established	Composition 2 October 1959 to 1 October 1960	Composition From 1 October 1960
Committee to Advise the Director General on Permanent Headquarters	20 March 1958	Brazil Bulgaria Canada India Netherlands Spain	Argentina Brazil Bulgaria Canada India Spain
Committee on Agreements for the Supply of Fissionable, Source and Other Materials	3 July 1958	Brazil Canada Czechoslovak Socialist Republic India Japan Union of Soviet Socialist Republics United Arab Republic United Kingdom of Great Britain and Northern Ireland United States of America	Brazil Canada India Iraq Japan Poland Union of Soviet Socialist Republics United Kingdom of Great Britain and Northern Ireland United States of America
Committee on Non-governmental Organizations	15 January 1959	Australia Czechoslovak Socialist Republic France India Japan Peru Union of Soviet Socialist Republics United States of America	El Salvador France India Japan Poland Union of Soviet Socialist Republics United Kingdom of Great Britain and Northern Ireland United States of America
Technical Assistance Committee	19 January 1959	Australia Brazil Canada Czechoslovak Socialist Republic France India Indonesia Japan Mexico Netherlands Norway Philippines	Argentina Brazil Canada Finland France Germany, Federal Republic of India Iraq Japan Mexico Philippines Poland

Title	Established	Composition	
		2 October 1959 to 1 October 1960	From 1 October 1960
Technical Assistance Committee (contd.)		Spain Union of Soviet Socialist Republics United Arab Republic United Kingdom of Great Britain and Northern Ireland United States of America Venezuela	Spain Thailand Union of Soviet Socialist Republics United Kingdom of Great Britain and Northern Ireland United States of America
Administrative and Budgetary Committee	19 January 1959	Brazil Canada Czechoslovak Socialist Republic France India Japan Union of Soviet Socialist Republics United Arab Republic United Kingdom of Great Britain and Northern Ireland United States of America	Brazil Canada France India Iraq Japan Poland South Africa Union of Soviet Socialist Republics United Kingdom of Great Britain and Northern Ireland United States of America

ANNEX II

RESIDENT REPRESENTATIVES OF MEMBER STATES

State	Resident Representative
ARGENTINA[a/]	Mr. A.B. Estévez
BELGIUM[a/]	Mr. J. Errera
BRAZIL[a/]	Mr. H.F.S. Bittencourt
BULGARIA[a/]	Mr. I. Daskalov
COLOMBIA	Mr. M. Uribe Uribe
CZECHOSLOVAK SOCIALIST REPUBLIC	Mr. K. Petrželka
DENMARK	Mr. S. Kristensen
EL SALVADOR[a/]	Mr. J. Contreras Chávez
FINLAND[a/]	Mr. O.U. Wartiovaara
GREECE	(Vacant)
HOLY SEE	Mgr. O. de Liva
INDONESIA	Mr. R.R. Djajakoesoema
IRAN	Mr. M. Mir Fakhrai
ISRAEL	Mr. I. Keenan
ITALY	Mr. E. Martino
MONACO	Mr. H. P. Masmejean
NETHERLANDS	Mr. H.F. Eschauzier
NORWAY	Mr. T. Oftedal
PERU	Mr. M. Sosa Pardo de Zela
POLAND[a/]	Mr. L. Leszczynski
PORTUGAL	Mr. C. Pericão de Almeida
ROMANIA	Mr. V. Dimitriu
SOUTH AFRICA[a/]	Mr. D.B. Sole
SPAIN[a/]	Mr. J.S. de Erice y O'Shea
SWEDEN	Mr. S. Allard
SWITZERLAND	Mr. B. de Fischer
TURKEY	(Vacant)
UNION OF SOVIET SOCIALIST REPUBLICS[a/]	Mr. V.M. Molotov
UNITED ARAB REPUBLIC	Mr. H.M. Tohamy

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND[a/]	Mr. J. McAdam Clark
UNITED STATES OF AMERICA[a/]	(Vacant)
YUGOSLAVIA	Mr. S. Nakičenović

Permanent Representative of the Secretary-General of the United Nations to the IAEA

Mr. Zahir Ahmed

a/ This State is also a Member of the Board of Governors during the year 1960-61.

ANNEX III

TEXT OF RESOLUTION 1531 (XV) ADOPTED BY THE GENERAL ASSEMBLY OF THE UNITED NATIONS ON 15 DECEMBER 1960

Possibilities of increasing voluntary contributions to the Operational Fund of the International Atomic Energy Agency

The General Assembly

Taking into consideration the report presented by the International Atomic Energy Agency concerning its program for 1960,[1]

Taking into account the role of the Economic and Social Council in co-ordinating assistance programs of the United Nations, the specialized agencies and the International Atomic Energy Agency,

Convinced that the program of technical assistance has acquired increasing importance among the activities of the International Atomic Energy Agency,

Considering that the program of technical assistance is largely financed by voluntary contributions from the States members of the International Atomic Energy Agency,

1. Invites the International Atomic Energy Agency to develop its program of technical assistance to help the less developed countries in the utilization of nuclear energy for peaceful purposes;

2. Invites the economically developed States Members of the United Nations and members of the International Atomic Energy Agency to increase their voluntary contributions to the Operational Fund of the Agency.

[1] Annual report of the Board of Governors to the General Conference, 1 July 1959 - 30 July 1960, Vienna, July 1960 (A/4531 and Corr. 1), and document A/4531/Add. 1.

ANNEX IV

NON-GOVERNMENTAL ORGANIZATIONS HAVING CONSULTATIVE STATUS WITH THE AGENCY

European Atomic Forum

European Confederation of Agriculture

International Air Transport Association

International Cargo Handling Co-ordination Association

International Chamber of Commerce

International Commission on Radiological Protection

International Commission on Radiological Units and Measurements

International Confederation of Free Trade Unions

International Co-operative Alliance

International Council of Scientific Unions

International Federation of Christian Trade Unions

International Federation of Documentation

International Federation of Industrial Self-Consuming Producers of Electricity

International Organization for Standardization

International Union for Inland Navigation

International Union of Producers and Distributors of Electrical Energy

Japan Atomic Industrial Forum, Inc.

World Federation of United Nations Associations

World Power Conference

ANNEX V

OUSTANDING CONTRIBUTIONS TO THE 1958, 1959 AND 1960 REGULAR BUDGETS

(Expressed in United States dollars)

Member	1958	1959	1960	Total
ARGENTINA	-	-	50 968	50 968
CHINA	-	180 570	271 700	452 270
CUBA	10 222	12 018	13 439	35 679
EL SALVADOR	-	-	2 095	2 095
GUATEMALA	-	2 092	2 921	5 013
HAITI	-	2 021	2 337	4 358
HONDURAS	1 635	2 090	2 337	6 062
HUNGARY	-	19 744	22 788	42 532
NICARAGUA	-	2 021	2 337	4 358
PARAGUAY	1 636	2 090	2 337	6 063
PERU	-	-	4 803	4 803
UNITED ARAB REPUBLIC	-	-	751	751
VENEZUELA	-	-	26 193	26 193
CHILE			14 608	14 608
COLOMBIA			16 945	16 945
SENEGAL			2 921	2 921
	13 493	222 646	439 480	675 619

ANNEX VI

ADVANCES TO THE WORKING CAPITAL FUND

(Expressed in United States dollars)

Member	Assessed	Paid	Balance
AFGHANISTAN	1 000	1 000	-
ALBANIA	800	800	-
ARGENTINA	20 600	20 600	-
AUSTRALIA	33 200	33 200	-
AUSTRIA	8 000	8 000	-
BELGIUM	24 000	24 000	-
BRAZIL	18 800	18 800	-
BULGARIA	3 000	3 000	-
BURMA	1 400	1 400	-
BYELORUSSIAN SOVIET SOCIALIST REPUBLIC	8 600	8 600	-
CAMBODIA	800	800	-
CANADA	57 600	57 600	-
CEYLON	1 800	1 800	-
CHILE	5 000	-	5 000
CHINA	92 800	92 800	-
CUBA	4 600	-	4 600
CZECHOSLOVAK SOCIALIST REPUBLIC	16 200	16 200	-
DENMARK	11 200	11 200	-
DOMINICAN REPUBLIC	1 000	1 000	-
ECUADOR	1 000	1 000	-
EL SALVADOR	1 000	1 000	-
ETHIOPIA	1 000	1 000	-
FINLAND	6 600	6 600	-
FRANCE	118 600	118 600	-
GERMANY, FEDERAL REPUBLIC OF	98 600	98 600	-
GREECE	4 200	4 200	-
GUATEMALA	1 000	1 000	-
HAITI	800	800	-
HOLY SEE	800	800	-
HONDURAS	800	800	-
HUNGARY	7 800	7 800	-
ICELAND	800	800	-
INDIA	45 600	45 600	-
INDONESIA	8 600	8 600	-

Member	Assessed	Paid	Balance
IRAN	3 800	3 800	-
IRAQ	1 600	1 600	-
ISRAEL	2 600	2 600	-
ITALY	41 600	41 600	-
JAPAN	40 600	40 600	-
KOREA, REPUBLIC OF	3 800	3 800	-
LUXEMBOURG	1 000	1 000	-
MEXICO	13 200	13 200	-
MONACO	800	800	-
MOROCCO	2 600	2 600	-
NETHERLANDS	18 600	18 600	-
NEW ZEALAND	7 800	7 800	-
NICARAGUA	800	800	-
NORWAY	9 000	9 000	-
PAKISTAN	7 400	7 400	-
PARAGUAY	800	-	800
PERU	2 000	2 000	-
PHILIPPINES	8 000	8 000	-
POLAND	25 400	25 400	-
PORTUGAL	3 800	3 800	-
ROMANIA	6 200	6 200	-
SOUTH AFRICA	10 400	10 400	-
SPAIN	17 200	17 200	-
SUDAN	1 000	1 000	-
SWEDEN	25 800	25 800	-
SWITZERLAND	18 000	18 000	-
THAILAND	3 000	3 000	-
TUNISIA	1 000	1 000	-
TURKEY	11 000	11 000	-
UKRAINIAN SOVIET SOCIALIST REPUBLIC	33 400	33 400	-
UNION OF SOVIET SOCIALIST REPUBLICS	252 200	252 200	-
UNITED ARAB REPUBLIC	6 000	6 000	-
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	144 000	144 000	-
UNITED STATES OF AMERICA	648 600	648 600	-
VENEZUELA	9 200	9 200	-

Member	Assessed	Paid	Balance
VIET-NAM	3 800	3 800	-
YUGOSLAVIA	6 400	6 400	-
	2 000 000	1 989 600	10 400
New Members			
COLOMBIA	5 800	5 800	-
GHANA	1 200	1 200	-
LEBANON	1 000	-	1 000
SENEGAL	1 000	-	1 000
	9 000	7 000	2 000

ANNEX VII

CONTRIBUTIONS TO THE 1961 REGULAR BUDGET

(Expressed in United States dollars)

Member	Assessed	Paid	Outstanding
AFGHANISTAN	3 084	3 084	-
ALBANIA	2 467	69	2 398
ARGENTINA	63 530	-	63 530
AUSTRALIA	102 389	52 497	49 892
AUSTRIA	24 672	12 672	12 000
BELGIUM	74 016	65 343	8 673
BRAZIL	57 979	1 913	56 066
BULGARIA	9 252	223	9 029
BURMA	4 318	171	4 147
BYELORUSSIAN SOVIET SOCIALIST REPUBLIC	26 523	971	25 552
CAMBODIA	2 467	69	2 398
CANADA	177 639	177 639	-
CEYLON	5 551	5 551	-
CHILE	15 420	-	15 420
CHINA	286 195	-	286 195
CUBA	14 186	-	14 186
CZECHOSLOVAK SOCIALIST REPUBLIC	49 961	49 961	-
DENMARK	34 541	34 541	-
DOMINICAN REPUBLIC	3 084	86	2 998
ECUADOR	3 084	2 699	385
EL SALVADOR	3 084	-	3 084
ETHIOPIA	3 084	171	2 913
FINLAND	20 354	20 354	-
FRANCE	365 762	365 762	-
GERMANY, FEDERAL REPUBLIC OF	304 083	155 587	148 496
GREECE	12 953	308	12 645
GUATEMALA	3 084	-	3 084
HAITI	2 467	-	2 467
HOLY SEE	2 467	2 467	-
HONDURAS	2 467	-	2 467
HUNGARY	24 055	-	24 055
ICELAND	2 467	2 467	-
INDIA	140 630	140 630	-
INDONESIA	26 523	1 005	25 518

Member	Assessed	Paid	Outstanding
IRAN	11 719	428	11 291
IRAQ	4 934	4 934	-
ISRAEL	8 018	8 018	-
ITALY	128 294	65 892	62 402
JAPAN	125 210	125 210	-
KOREA, REPUBLIC OF	11 719	206	11 513
LUXEMBOURG	3 084	3 084	-
MEXICO	40 709	40 709	-
MONACO	2 467	2 467	-
MOROCCO	8 018	188	7 830
NETHERLANDS	57 363	33 716	23 647
NEW ZEALAND	24 055	685	23 370
NICARAGUA	2 467	-	2 467
NORWAY	27 756	771	26 985
PAKISTAN	22 822	874	21 948
PARAGUAY	2 467	-	2 467
PERU	6 168	-	6 168
PHILIPPINES	24 672	651	24 021
POLAND	78 334	42 447	35 887
PORTUGAL	11 719	11 719	-
ROMANIA	19 121	19 121	-
SOUTH AFRICA	32 074	32 074	-
SPAIN	53 045	53 045	-
SUDAN	3 084	3 084	-
SWEDEN	79 567	2 313	77 254
SWITZERLAND	55 512	55 512	-
THAILAND	9 252	9 252	-
TUNISIA	3 084	86	2 998
TURKEY	33 924	33 924	-
UKRAINIAN SOVIET SOCIALIST REPUBLIC	103 006	2 895	100 111
UNION OF SOVIET SOCIALIST REPUBLICS	777 785	399 244	378 541
UNITED ARAB REPUBLIC	18 504	-	18 504
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	444 096	444 096	-
UNITED STATES OF AMERICA	2 000 283	58 708	1 941 575
VENEZUELA	28 373	-	28 373

Member	Assessed	Paid	Outstanding
VIET-NAM	11 719	11 719	-
YUGOSLAVIA	19 738	5 358	14 380
	6 168 000	2 568 670	3 599 330
New Members			
COLOMBIA	17 887	-	17 887
GHANA	3 701	3 701	-
LEBANON	3 084	-	3 084
SENEGAL	3 084	-	3 084
	27 756	3 701	24 055

ANNEX VIII

VOLUNTARY CONTRIBUTIONS TO THE GENERAL FUND

A. For 1961

Member	Pledged	Equivalent in United States dollars (Technical Assistance Board rates)	Paid $
ARGENTINA	$ 15 000	15 000	15 000
AUSTRALIA	$ 20 000	20 000	20 000
AUSTRIA	$ 5 000	5 000	-
BRAZIL	$ 30 000	30 000	30 000
CANADA	$ 52 020	52 020	-
CEYLON non-convertible Ceylonese Rupees	10 000	2 100	-
CHINA	$ 5 000	5 000	-
CZECHOSLOVAK SOCIALIST REPUBLIC	a/	-	-
DENMARK	$ 10 080	10 080	10 080
FINLAND	$ 6 000	6 000	6 000
FRANCE	b/	30 000	-
GERMANY, FEDERAL REPUBLIC OF	$ 50 000	50 000	25 000
GREECE	$ 2 500	2 500	-
HOLY SEE	$ 2 000	2 000	2 000
INDIA Indian Rupees equivalent to	$ 25 000	25 000	25 000
IRAQ	$ 3 000	3 000	3 000
ISRAEL Israeli	£ 4 000	1 852 c/	-
ITALY	d/	-	-
JAPAN	$ 25 000	25 000	25 000
KOREA, REPUBLIC OF	$ 3 000	3 000	-
MEXICO	$ 7 500	7 500	7 500
MONACO	$ 2 000	42 000	2 000
plus French Francs equivalent to	$ 40 000		
NETHERLANDS	$ 15 000	15 000	-
NORWAY	$ 8 100	8 100	-
PAKISTAN Pakistani Rupees and $ to the value of	$ 6 000	6 000	-
PHILIPPINES	$ 3 000	3 000	3 000
POLAND Zlotys	100 000	4 167	-
PORTUGAL	$ 3 500	3 500	-
SOUTH AFRICA South African £ equivalent to	$ 15 000	15 000	-

Member	Pledged	Equivalent in United States dollars (Technical Assistance Board rates)	Paid $
SWEDEN	$ 20 000	20 000	-
SWITZERLAND	Swiss Francs 50 000	11 521	-
THAILAND	$ 2 700	2 700	-
UNION OF SOVIET SOCIALIST REPUBLICS	a/	-	-
UNITED ARAB REPUBLIC	Egyptian £ 5 000	11 261	10 135
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	£ Sterling equivalent to $ 140 000	140 000	140 000
UNITED STATES OF AMERICA	$ 500 000	500 000	500 000
VENEZUELA	$ 8 200	8 200	-
YUGOSLAVIA	non-convertible Dinars equivalent to $ 5 000	5 000	-
		1 090 501	823 715
UNITED STATES OF AMERICA (Matching contribution) e/		90 871	-
		1 181 372	823 715

a/ The pledge will depend on the utilization of funds put at the Agency's disposal in previous years.

b/ An amount in French Francs at least equivalent to the pledge for 1960.

c/ This was shown in former tables as $2 222, but due to the change in the TAB rate of exchange, it now stands at $1 852.

d/ Amount to be announced later.

e/ Any difference between the US matching contribution and the excess of other contributions over the sum of $1 000 000 is due to fluctuations in the TAB rates of exchange for pledges made in local currencies.

B. For 1960

Member	Pledged	Equivalent in United States dollars (Technical Assistance Board rates)	Paid $
AUSTRALIA	$ 12 500	12 500	12 500
AUSTRIA	$ 5 000	5 000	5 000
BRAZIL	$ 15 000	15 000	15 000
BULGARIA	Leva 5 000	735	-
BURMA	$ 1 000	1 000	1 000
CANADA	$ 50 000	50 000	50 000
CEYLON	Ceylonese Rupees equivalent to $ 1 250	1 250	1 250
CHINA	$ 5 000	5 000	5 000
CZECHOSLOVAK SOCIALIST REPUBLIC	Korunas 100 000	13 888	13 888
DENMARK	$ 8 400	8 400	8 400
FINLAND	$ 5 000	5 000	5 000
FRANCE	French Francs 150 000	30 612	30 612
GERMANY, FEDERAL REPUBLIC OF	$ 40 000	40 000	40 000
GREECE	Austrian Schillings equivalent to $ 2 500	2 500	2 500
HOLY SEE	$ 2 000	2 000	2 000
INDIA	Indian Rupees equivalent to $ 20 000	20 000	20 000
ISRAEL	Israeli £ 2 000	1 111	1 111
ITALY	$ 30 000	30 000	30 000
JAPAN	$ 22 000	22 000	22 000
KOREA, REPUBLIC OF	$ 2 000	2 000	2 000
MEXICO	Pesos 62 500	5 000	5 000
MONACO	$ 2 000	2 000	2 000
NETHERLANDS	$ 12 500	12 500	12 500
NORWAY	Kroner 50 000	7 000	7 000
PAKISTAN	$ 2 000 plus		
	Pakistani Rupees equivalent to $ 2 000	4 000	4 000
PHILIPPINES	$ 2 000	2 000	2 000
PORTUGAL	$ 3 500	3 500	3 500
SOUTH AFRICA	$ 10 000	10 000	10 000
SWEDEN	$ 20 000	20 000	20 000
SWITZERLAND	Swiss Francs 50 000	11 628	11 628
TURKEY	Turkish £ 40 000	4 444	4 444
UNITED ARAB REPUBLIC	Egyptian £ 4 500	10 135	10 135

Member	Pledged	Equivalent in United States dollars (Technical Assistance Board rates)	Paid $
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND			
£ Sterling equivalent to	$ 125 000	125 000	125 000
UNITED STATES OF AMERICA	$ 500 000	500 000	500 000
VENEZUELA	$ 6 900	6 900	6 900
YUGOSLAVIA Dinars equivalent to	$ 4 000	4 000	4 000
		996 103	995 368

C. For 1959

Of the voluntary contributions pledged for 1959 [1], an amount of $1 000 is still outstanding from Guatemala.

[1] See GC(IV)/114, Annex V.

ANNEX IX

OFFERS OF TYPE II FELLOWSHIPS[a/]

Member	1960	1961
BELGIUM	7	7
BRAZIL	-	30
CHINA	-	4
CZECHOSLOVAK SOCIALIST REPUBLIC	15[b/]	15[b/]
DENMARK	5	5
FINLAND	2	-
FRANCE	12	-
GERMANY, FEDERAL REPUBLIC OF	-	9
INDIA	5	5
ITALY	10	10
JAPAN	30	-
NETHERLANDS	-	3
POLAND	-	5
UNION OF SOVIET SOCIALIST REPUBLICS	-	25[c/]
UNITED STATES OF AMERICA	100	50
YUGOSLAVIA	5	-

a/ This Annex covers the offers of fellowships for the 1960 and 1961 fellowship programs received by the Agency by 30 June 1961.

b/ Including eight for long term (5-6 years) training.

c/ Offers for long term (5-6 years) training.

ANNEX X

OFFERS OF EXPERTS RECEIVED

Member	Number of experts offered	Expense to the Agency
ARGENTINA	a/	none
AUSTRALIA	a/	a/
BELGIUM	a/	a/
CANADA	a/	Canada will pay as their financial provisions permit
CZECHOSLOVAK SOCIALIST REPUBLIC	10	a/
DENMARK	a/	a/
FRANCE	5-10	Agency or recipient countries to pay
INDIA	a/	a/
ISRAEL	a/	a/
ITALY	a/	a/
JAPAN	2	none
SOUTH AFRICA	a/	a/
SWITZERLAND	a/	a/
UNION OF SOVIET SOCIALIST REPUBLICS	20-30	none
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	a/	a/
UNITED STATES OF AMERICA	20-30	none
YUGOSLAVIA	20	a/

a/ Not specified.

ANNEX XI

CONFERENCES, SEMINARS AND SYMPOSIA

A. Held in 1960

Date	Title	Place	Co-sponsoring organizations
Conferences			
5-9 September	Conference on Small and Medium Power Reactors	Vienna	
6-17 September	Conference on the Use of Radioisotopes in the Physical Sciences and Industry	Copenhagen, Denmark	UNESCO
Seminars			
25-29 April	Seminar on Codes for Reactor Computations	Vienna	
Symposia			
10-13 May	Symposium on Fuel Element Fabrication, with Special Emphasis on Cladding Materials	Vienna	
7-11 June	Symposium on Selected Topics in Radiation Dosimetry	Vienna	
8-12 August	Symposium on the Effects of Ionizing Radiation on Seeds and their Significance for Crop Improvement	Karlsruhe, Federal Republic of Germany	FAO
11-14 October	Symposium on Inelastic Scattering of Neutrons in Solids and Liquids	Vienna	
17-21 October	Symposium on Pile Neutron Research in Physics	Vienna	
24-27 October	Symposium on the Chemical Effects of Nuclear Transformations	Prague, Czechoslovak Socialist Republic	
14-18 November	Symposium on Nuclear Ship Propulsion with Special Reference to Nuclear Safety	Taormina, Italy	IMCO
5-9 December	Symposium on Radioisotopes and Radiation in Entomology	Bombay, India	
12-16 December	Symposium on the Use of Radioisotopes in the Study of Endemic and Tropical Diseases	Bangkok, Thailand	WHO

B. Program for 1961

Date	Title	Place	Co-sponsoring organizations
Conferences			
15-20 May	Conference on Nuclear Electronics	Belgrade, Yugoslavia	
4-8 September	Conference on Plasma Physics and Controlled Nuclear Fusion Research	Salzburg, Austria	
21 November-1 December	Conference on the Use of Radioisotopes in Animal Biology and the Medical Sciences	Mexico City	FAO WHO
Seminars			
3-11 August	Seminar on the Physics of Fast and Intermediate Reactors	Vienna	
6-10 November	Regional Seminar on Educational Problems of Nuclear Energy	San Carlos de Bariloche, Argentina	IANEC UNESCO
Symposia			
3-10 May	Symposium on the Detection and Use of Tritium in the Physical and Biological Sciences[a/]	Vienna	
5-9 June	Symposium on the Effects of Ionizing Radiation on the Nervous System	Vienna	
12-16 June	Symposium on Whole Body Counting	Vienna	
16-20 October	Symposium on the Programming and Utilization of Research Reactors	Vienna	
23-27 October	Symposium on Power Reactor Experiments	Vienna	

a/ Organized in co-operation with the Joint Commission on Applied Radioactivity (of ICSU).

ANNEX XII

PANELS

(Convened between 1 July 1960 and 30 June 1961)

Titles	Dates
Panel on Safe Operation of Critical Assemblies and Research Reactors	4-15 July 1960
Panel on Liability for Nuclear Propelled Ships	1-6 August 1960
Panel to Advise on the Agency's Strontium-90 Research Program	3-5 October 1960
Advisory Panel on the Dissemination of Scientific Information in the Field of Nuclear Energy (second group of meetings)	3-7 October 1960
Panel on Basic Safety Standards	31 October - 5 November 1960
Panel on Physical Data on Dose Distribution of High Energy Radiation	7-11 November 1960
Panel on Nuclear Power Costing	21-25 November 1960
Panel on Radioactive Waste Disposal into Fresh Water	28 November - 2 December 1960
Panel on the Legal Implications of the Disposal of Radioactive Waste into the Sea	16-21 January 1961
Panel on the Problem of an International Center of Theoretical Physics	21-22 March 1961
Panel on the Review of the Manual on Low Level Waste Disposal Techniques	27-30 March 1961
Panel on Co-ordination of Research Contracts on Selected Topics in Radiobiology (second group of meetings)	28-30 March 1961
Panel on Methods of Monitoring Radioactive Waste Disposal into the Sea	17-22 April 1961
Panel on Radioactive Waste Disposal into Fresh Water (second group of meetings)	8-12 May 1961
Panel on the Uses of Radioisotopes in Soil-Plant Relations and Fertilization Studies	15-19 May 1961
Panel on Nuclear Ship Safety - Harbor Criteria	23-26 May 1961
Panel on Basic Safety Standards (second group of meetings)	29 May - 2 June 1961

Type \ Subject	Biology, Medicine and Agriculture	Health, Safety and Waste Disposal	Physics, Plasma Physics and Electronics	Chemistry, Geology and Raw Materials
Proceedings of Scientific Meetings		Disposal of Radioactive Wastes, Vol. II	Metrology of Radionuclides Selected Topics in Radiation Dosimetry	Radioactivation Analysis [a]
Technical Directories				
Safety Series		No.2 Safe Handling of Radioisotopes – Health Physics Addendum [c] No.3. Safe Handling of Radioisotopes – Medical Addendum [c] No.6. Regulations for the Safe Transport of Radioactive Materials [d]		
Review Series	No. 7. The Application of Radioisotopes in Biology No.10. Radiation in Agricultural Research and Practice	No.12. The Packaging, Transport and Related Handling of Radioactive Materials	No.14. *Préparation et Etalonnage des sources Radioactives de Références* No.15. Radioactive isotopes and their Production under Neutron irradiation	No.5. Mass Spect... for Uranium Isotopic Measurements No.13. Radiation-initi... ed Polymerization and Graft Polymerization
Bibliographies				
Technical Reports Series				
Panel Reports	Radiation Damage in Bone Radioactive Substances in the Biosphere Therapeutic Dose Distributions with High-Energy Radiation Use of Radioisotopes & Supervoltage Radiation in Radioteletherapy [c]			
Journals			Nuclear Fusion - Journal of Plasma Physics and Thermonuclear Fusion, Vol. 1, Nos. 1 & 2	
Documentary Material				

a) Published by Butterworths Ltd., London; scientific editing by a member of the Agency's staff.

b) Published by the Academic Press; scientific editing by the Agency's staff.

c) Available in English, French, Russian and Spanish.

d) Available in English; the French, Russian and Spanish editions will be issued shorthly.

e) Available in English and Russian.

f) Reports of Preliminary Assistance Missions to the Ivory Coast, Mali, Morocco and Tunisia were issued in English and Frenc... to El Salvador, Guatemala, Mexico and Paraguay in English and Spanish; and to Greece and Sudan in English. The report on Peru will be issued shortly.

g) Lists of institutions have been issued for the following countries: Canada, India, Japan, Monaco, the Netherlands, New Zealand, Switzerland, the United Kingdom and Venezuela.

eactor Physics and eactors	Industrial Applications	Economics	Law	Miscellaneous Documentation
odes for Reactor omputations uel Element Fabrica-on [b]	Large Radiation Sources in Industry, Vol. II			
irectory of Nuclear eactors, Vol. III	Directory of Equipment for Radioisotope Applications			
o.4. Safe Operation of itical Assemblies id Research eactors [d]				
he Behaviour of eactor Components adation o.8. Research, Experi-ntal and Test Reactors o.11. Powder Metallurgy Nuclear Reactor nstruction	No.16. Experience in the Operation of Nuclear Power Stations	No.9. Comments on Some Aspects of Nuclear Power Economics		
o.2. Nuclear Reactors	No.3. Nuclear Propulsion			List of Bibliographies on Nuclear Energy, Vol.I, No. 2 List of References on Nuclear Energy, Vol. 2, Nos. 13-24 List of Periodicals in the Field of Nuclear Energy, Vol.I, Nos. 1-11
		No.2. Prospects of Nuclear Power in Finland		
			Liability of Operators of Nuclear Ships [c]	
				International Atomic Energy Agency Bulletin (4 issues and special issue)
		Management Control of Special Materials in Nuclear Installations [c]		Assistance trhough Fellowship and Exchange Programmes in Nuclear Science [c] List of Conferences, Meetings, Training Courses, Nos. 9 - 12 Services and Technical Assistance available from the IAEA [e] Reports of Preliminary Assistance Missions (ten countries [f] World List of Institutions concerned with nuclear energy [g] Publications Catalogue No. 3 [c] Supplement to Publications Catalogue, No. 3 [c]

ANNEX XIV

RESEARCH CONTRACTS

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		A. Safe disposal of radioactive waste		
		1. New contracts		
57/RB[b]	Australia	Division of Plant Industry, Commonwealth Scientific and Industrial Research Organisation, Canberra	An investigation of the factors which influence the movement of strontium-90 from soils to plants	6 800
58/RB[b]	United Arab Republic	United Arab Republic Atomic Energy Establishment and Institute of Oceanography, University of Cairo	An experimental study of Sr^{90} contained in certain marine animals following possible release of radioactive waste in sea water	8 970
59/RB[b]	Italy	Limnology Division, Centre of Nuclear Studies, Ispra, and the Italian Institute of Hydrobiology, Pallanza	Studies on the biological concentration of fission products in molluscs from water, with special reference to an index of radioactivity in water	14 800
62/US	Italy	Department of Zoology, University of Parma	The ecology of Acantharia (radiolaria) in relation to the circulation of strontium in the sea	16 174
88/RB	Japan	Japan Analytical Chemistry Research Institute, Tokyo	Study of radionuclides sorbed on marine sediments	5 000
94/RB	United States of America	Marine Laboratory, University of Miami, Florida	The uptake, accumulation and exchange of radioisotopes by open sea phytoplankton	13 510
97/RB	Czechoslovak Socialist Republic	Institute of Nuclear Research, Czechoslovak Academy of Sciences, Prague	Physico-chemical requirements for the disposal of low-activity liquid radioactive wastes in soil	8 300

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
98/RB	Czechoslovak Socialist Republic	Institute of Hydrodynamics, Czechoslovak Academy of Sciences, Prague	The hydrodynamics of the disposal of low-activity liquid radioactive wastes in soil	8 000
99/RB	Japan	Japan Analytical Chemistry Research Institute, Tokyo	A study on the radiochemical analysis of strontium, cesium and plutonium in biological materials	5 875
100/RB	United States of America	Department of Chemistry, University of North Carolina, Chapel Hill, N.C.	Ionic interaction near clay surfaces	8 600
101/RB	United States of America	Department of Soils and Plant Nutrition, University of California, Berkeley, California	An investigation of ionic exchange in soils using radioisotopes and isotopic dilution experiments	7 550
		2. Renewals		
$1R_2$/RB[b]	Austria	Institutes for Physical Chemistry and for Inorganic Chemistry, University of Vienna	Factors controlling the distribution of fission products in the biosphere	5 100
$9R_1$/RB[b]	Austria	Atomic Institute of the Austrian Universities, Vienna	Investigation of the possibility of using wood as an inexpensive raw material for the preparation of ion exchange substances to be employed in waste treatment apparatus	2 210
$1R_3$/RB	Austria	Institutes for Physical Chemistry and for Inorganic Chemistry, University of Vienna	Factors controlling the distribution of fission products in the biosphere	2 820
$9R_2$/RB	Austria	Atomic Institute of the Austrian Universities, Vienna	Investigation of the possibility of using wood as an inexpensive raw material for the preparation of ion exchange substances to be employed in waste treatment apparatus	2 200
$19R_1$/RB	Japan	Institute of Inorganic Chemistry, Faculty of Sciences, Tokyo Kyoiku University	Studies of contamination in local marine resources and more specifically the determination of horizontal and vertical diffusion rates in Suruga Bay	4 000

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
20R$_1$/RB	Japan	Fisheries Institute, Faculty of Agriculture, University of Tokyo	Studies in uptake of radioisotopes by edible marine products	4 000
22R$_1$/RB	Italy	National Committee for Nuclear Energy, Laboratory of Oceanography, Fiascherino, La Spezia	The study of uptake, accumulation and loss of radioactive material by marine bacteria	14 700
33R$_1$/RB	Argentina	Risk Evaluation Group, National Atomic Energy Commission, Buenos Aires	Behavior of fission products in soil	6 000
37R$_1$/RB	Norway	Norwegian Institute for Water Research, Oslo	The influence of radioactive wastes on biological conditions in a river	20 000
		3. Completed contracts		
12/RB[c]	International bodies	Working Group on Oceanic Radioactivity, Special Committee on Oceanic Research, International Council of Scientific Unions	(a) The co-ordination of observation and measurements of radioactivity in oceanic waters (b) The collaboration in measurements and analysis of C-14, H-3, U, Th, Ra, fission, and fissile and induced radioactivity in the oceanic environments (c) The methods of measurement of radioactivity associated with oceanic sediments, plankton, nekton, algae, etc. (d) The conduction of oceanic tracer experiments, both natural and artificial (e) Exchange of information and collection of references	2 740
16/RB	France	Central Agricultural Research Station, Ministry of Agriculture, Versailles	Possible competition between leaves and roots in herbaceous plants for absorption of radioisotopes	5 100
23/RB	Japan	Institute of Plant Nutrition and Fertilizer, University of Tokyo	The uptake of radioactive wastes by lowland rice from contaminated soils, due to irrigation water, and its decontamination	2 800

Contract number[a/]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		B. Health physics and radiation protection		
		1. New contracts		
73/RB	South Africa	Department of Medicine, University of Cape Town	A study of rickets using Ca^{47}	2 375
74/RB	Poland	Department of Isotopes, Institute of Oncology, Warsaw	Diagnostic applications of Ca^{47} in metastatic bone lesions	2 250
75/RB	Belgium	Institute of Anatomy, Catholic University of Louvain	Investigation of the rate of bone remodeling in normal and fractured long bone of the dog, with special reference to vascular aspects	1 125
76/RB	United Kingdom of Great Britain and Northern Ireland	Department of Medicine, Gardiner Institute, University of Glasgow	In vitro and in vivo studies with calcium-47 and other bone seeking isotopes	3 650
77/RB	France	Isotope Service, Fédération Mutualiste de la Seine, Paris	The use of Ca^{47} in the diagnosis of skeletal lesions in man	1 500
78/RB	Austria	First Medical Department, University of Vienna	Calcium balance studies in metabolic bone disease	1 000
79/RB	Denmark	Orthopaedic Hospital and Radiation Department of Finsen Institute, Copenhagen	A study of uptake of radioactive calcium in the skeleton	950
80/RB	United Kingdom	Department of Experimental Medicine, Guy's Hospital Medical School, London	Studies of calcium metabolism in bone diseases using Ca^{47}, with particular reference to gastro-intestinal absorption	1 500
82/RB	United Kingdom	Department of Endocrinology, Postgraduate Medical School of London	Studies of bone metabolism in man with Ca^{47}	500

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
93/RB	France	Research Centre for Cancer and Radiopathology, Association Claude Bernard, St. Louis Hospital, Paris	The use of bone marrow grafting in the treatment of accidentally irradiated persons and in animal experiments	14 280
		2. Renewals		
$14R_1$/RB	Austria	Institute of Plant Physiology, University of Vienna	Effect of radiation on plant cells and its modification with protective substances	3 100
$18R_1$/RB	Netherlands	Radiobiological Department, Physiological Laboratory, University of Groningen	Investigation of intracellular chemical radiation protection substances, using as indicator immediate low level X-ray reactions	8 000
$34R_1$/RB	Czechoslovak Socialist Republic	Institute of Biology, Department of Experimental Biology and Genetics, Czechoslovak Academy of Sciences	The investigation of a method of two-step grafting of haematopoietic and germinal tissues to counteract incipient radiation sterility resulting from accidental exposure to ionizing radiation	14 200
$38R_1$/RB	Switzerland	Radium Institute, Geneva	Measurements of radium and radiostrontium accumulation in humans and study of its biological effects	10 500
$44R_1$/RB	Yugoslavia	Department of Biochemistry, Biological Laboratory, Institute of Nuclear Sciences Boris Kidric, Belgrade	Recovery effects of highly polymerized (native) nucleic acids injected into lethally irradiated animals	4 500
$53R_1$/RB	Austria	Institute for Applied Microbiology, Agricultural University, Vienna	Selection of sulfhydril compounds for radiation protection, using a new microbiological method	2 730
		3. Completed contracts		
3/RB	Austria	Physiological Institute, University of Vienna	Investigation on the mode of the protective action of certain sulfhydril compounds against radiation effects on the synthesis of deoxyribonucleic acid, using tritium labeled thymidin	12 325[d]
6/RB[c]	Italy	Institute of Physics, University of Trieste	Investigation and development of a new method of monitoring and dosimetry for low fluxes of fast neutrons, involving the use of a bubble chamber	7 000

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		C. Radiobiology		
		1. New contracts		
15/RB	Belgium	Institute of General Pathology, Microbiology and Biochemistry, University of Liège	Study of chemically induced metabolic modifications of cells susceptible to modify the sensitivity of micro-organisms to ionizing radiations	8 000
46/RB	Federal Republic of Germany	Institute of Physiological Chemistry, Johannes Gutenberg University, Mainz	Comparison between modifications induced by ionizing radiation when nucleic acids are respectively irradiated within intact or lyophilized cells, within isolated cell nuclei or in the pure state	7 800
61/US	Italy	Institute of Genetics, University of Pavia	Mutability of polygenes and the utilization of induced genetic variability	22 000
68/US	Brazil	Institute of Biophysics, University of Brazil, Rio de Janeiro	Radiobiological study of the lysogenic system of staphylococcus albus	5 500
69/US	Italy	Institute of Biological Chemistry, Faculty of Pharmacy, University of Trieste	Study and comparison of necrolytic and radiolytic lesions at mitochondrial level (lysosomes) in aseptic perfused heart muscle	13 700
83/RB	India	Vallabhbhai Patel Chest Institute, University of Delhi	The immediate effect of radiation on fatty acid metabolism	2 900
84/RB	United Kingdom	Department of Radiotherapeutics, University of Cambridge and the Radiotherapeutic Centre, Addenbrooke's Hospital, Cambridge	Development of radioactive drugs, with special reference to tritiated drugs as radiotherapeutic agents	4 000
85/RB	Spain	Institute Gregorio Marañon, Centre of Biological Research, Madrid	Peripheral metabolism of thyroid hormone(s) via deshalogenating pathways and its role in thyroid-pituitary interrelationships and metabolic effectiveness	11 535

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
86/RB	Australia	Department of Bacteriology, University of Melbourne	Influence of radiation and radiomimetic chemicals on genetic transduction in Pseudomonas aeruginosa	2 850
91/RB	Hungary	Department of Food Technology and Microbiology, College of Horticulture and Viticulture, Budapest	Study of the relative radiosensitivities of moulds and their pectic enzymes	5 500
95/RB	Chile	Radioisotopes Laboratory, Institute of Experimental Medicine, University of Chile, Santiago	Effects of radiations (large and low doses) on the metabolism of the central nervous system	11 750
96/RB	United Arab Republic	Atomic Energy Establishment and National Research Centre, Cairo	An attempt to correlate quantitatively the changes in permeability of mammalian muscle cells with the radiation dose	5 900
103/US	United Kingdom	Chester Beatty Research Institute, Institute of Cancer Research, Royal Cancer Hospital, London	Tissue therapy after irradiation	5 000
		2. Renewals		
$10R_1$/RB	United Kingdom	Chester Beatty Research Institute, Institute of Cancer Research, Royal Cancer Hospital, London	Determination of the reasons for the great variations in radiosensitivity of different micro-organisms and the examination of the possibility of sensitizing micro-organisms to ionizing radiation	7 000
$11R_1$/US	Sweden	Institute for Medical Genetics, University of Uppsala	Genetical investigations on the effect of ionizing radiation on human cells grown in vitro	10 920
$17R_1$/RB	France	Virus Department, Pasteur Institute of Paris, and Nuclear Study Centre of Saclay, and the Radium Institute, Paris	Action of ionizing radiations on pathogenic human and animal viruses; effects on virulence and antigenic vaccinogen activity	8 000

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
29R_1/RB	France	Agricultural Research Station, Ministry of Agriculture, Versailles	Study of radiosensitivity and isolation of radioresistant strains of lactic bacillus	10 000
30R_1/RB	France	Central Dairy and Microbiology Research Station, Ministry of Agriculture, Jouy-en-Josas	Study of the mechanism of activation and inactivation of bacterial spores with ionizing radiation	10 200
31R_1/US	Finland	Institute of Genetics, Department of Botany, University of Turku	Mutation rate at specific autosomal loci in different species of Drosophila	9 350
35R_1/RB	United Kingdom	Department of Biochemistry, University of Oxford	Study of the primary biochemical lesions produced by ionizing radiations in mammalian tissues	4 500
36R_1/RB	Italy	Institute of Zoology and Comparative Anatomy, University of Padova	A quantitative evaluation of cell survival as a function of radiation dose	5 000
39R_1/RB	Switzerland	Physiological Institute, University of Geneva	Changes in spontaneous activities and in artificially stimulated electrophysiological responses of the nervous system of unanaesthetized animals exposed to various doses of localized radiations	4 870
42R_1/RB	Poland	Department of Health Protection, Institute of Nuclear Research, Warsaw	Mechanism of proteolysis of I^{131} labeled fibrinogen	2 520
45R_1/RB	Norway	Norsk Hydro's Institute for Cancer Research, The Norwegian Radium Hospital, Oslo	An investigation of the radiosensitivity of the spermatogonia of Drosophila melanogaster	5 000
51R_1/RB	Netherlands	Laboratory for Applied Enzymology and Radiobiology, State University, Leyden	Investigation of the effects of ionizing radiation on the genetic material of bacteriophages with emphasis on the production, fractionation and purification of irradiated DNA	13 000

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		3. Completed contracts		
2/RB[c]	Austria	Pharmacological Institute, University of Vienna	Electrophysiological responses of biological systems, in particular of nerve cells, to irradiation with small doses of X-rays and other types of ionizing radiation	20 952[d]
13/RB	Japan	Institute of Applied Microbiology, University of Tokyo	Effects of incorporated radioisotopes upon the stability of genetic materials	4 000
28/RB	Japan	Department of Morphological Genetics, National Institute of Genetics, Misima	Comparison between mutation rates induced by acute and chronic gamma irradiation	6 360
		D. Safeguards methods		
		1. New contracts		
87/RB	Italy	United Laboratories of Studies and Research, San Donato Milanese	Development of a method of non-destructive analysis of irradiated fuel elements for uranium-235 and plutonium content by monitoring and spectrometry	17 000
92/RB	India	Department of Atomic Energy of the Government of India, Bombay	Development of a method of non-destructive analysis of irradiated fuel elements for uranium-235 and plutonium content by measuring the fission rates at different neutron energies	30 000
		2. Renewals - none		
		3. Completed contracts		
4/RB[c]	France	Atomic Energy Commission, Paris	Development of a method of non-destructive analysis to determine the uranium-235 and plutonium content of irradiated fuel elements that are in storage under water and that have been out of the reactor for periods of more than one month	25 000
5/RB[c]	Belgium	Nuclear Energy Study Centre, Brussels	Non-destructive analysis of irradiated fuel elements	8 000
7/RB[c]	United States of America	United States Atomic Energy Commission	Non-destructive analysis of irradiated and unirradiated fuel elements for nuclear reactors	3 500

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		E. Reactor studies		
		New contracts		
60/RB[b]	Israel	Technion-Israel Institute of Technology, Department of Nuclear Science, Haifa	Study of the stability of reactor systems by means of an analogue simulator	9 410
104/US	Norway	Institute for Atomic Energy, Kjeller, Lillestrøm	Experimental program in reactor physics (NORA reactor project)	54 000
		F. Application of radioisotopes in medicine		
		1. New contracts		
89/OB	South Africa	Department of Medicine, University of Cape Town	(a) Study of the effects of malnutrition on albumen metabolism in man (b) Study of metabolism of iodinated tyrosines in deficiency states	4 035
		2. Renewals		
$8R_2$/OB	Greece	Department of Clinical Therapeutics, University of Athens	(a) Scanning of the liver following administration of radioiodine-labelled Rose Bengal in patients carrying echinococcus cysts (b) Studies of iron metabolism with radioiron and of red cell life span with radiochromium in patients suffering from either thalassaemia or sickle cell anaemia	6 200
$24R_1$/OB	Thailand	University of Medical Sciences, Bangkok	Red cell survival studies with radioisotopes in thalassaemia haemoglobin-E and thalassaemia haemoglobin-H disease	2 600
$25R_1$/OB	Philippines	Radioisotope Laboratory and Thyroid Clinic, University of the Philippines, Manila	Radioisotopic investigation of the cause of endemic goitre in various places in the Philippines	8 900
$26R_1$/OB	Iraq	Radioisotopes Department, Republic Hospital, Baghdad	(a) Red cell life span in patients with congenital or acquired haemolytic anaemia, using radiochromium and pre-operative spleen scanning	4 800

Contract number[a/]	Country	Institution	Title of contract	Amount of Agency contribution in US $
			(b) The aetiology of tropical iron deficiency anaemia, using radio-iron in patients with parasitic infections and in cases losing iron through sweat or desquamation	
$54R_1$/OB	Israel	Tel Hashomer Government Hospital, Radium and Isotopes Institute, Tel Hashomer	Use of radioisotope scanning in liver pathology	10 200
		G. Application of radioisotopes in agriculture		
		1. New contracts		
64/US	Italy	Plant Genetics Institute, Catholic University, Piacenza	Induction of genetic mutations by irradiation in plant species of economic importance	3 650
66/US	Federal Republic of Germany	Max-Planck-Institute for Research on Breeding, Köln-Vogelsang	Development of selection methods for induced small mutations in higher plants with special regard to mutations of yielding capacity	8 120
70/US	United Kingdom	National Institute for Research in Dairying, Shinfield, Berkshire	The digestion, absorption, transport and metabolism of fats in the ruminant	15 550
71/US	China	Department of Agronomy, Taiwan Provincial College of Agriculture, Taichung, Taiwan	Use of radiation treatment methods to study rice genetics and improve rice varieties used in Southeast Asia	6 000
90/OB	Portugal	Isotope Laboratory, National Institute of Agronomy, Sacavém	A study of the ways of avoiding fertilizer phosphorus fixation and increasing the availability of the soil phosphorus in brown, red and yellow mediterranean soils	4 000
102/OB	China	Department of Agronomy, College of Agriculture, National Taiwan University, Taipei, Taiwan	The use of radioisotope-labelled compounds in studies on foliar application of fertilizers and growth-regulators on rice	4 520

Contract number[a]	Country	Institution	Title of contract	Amount of Agency contribution in US $
		2. Renewals		
21R$_1$/OB	Japan	Institute of Plant Nutrition and Fertilizer, University of Tokyo	Studies on the use of radioactive isotopes for fertilizer evaluation	2 800
27R$_1$/OB	Japan	Kihara Institute for Biological Research, Yokohama	Application of radiation induced mutations to plant breeding	5 040
55R$_1$/OB	Yugoslavia	Department of Plant Breeding and Genetics, Faculty of Agriculture and Forestry	Production of useful mutations in agricultural plants through radiation	1 000
		H. Miscellaneous fields		
		New contracts		
63/US	United Kingdom	Institute of Animal Physiology, Agricultural Research Council, Babraham Hall, Cambridge	Lipid metabolism in the digestive tract of the sheep	8 400
67/US	Austria	Analytical Institute, University of Vienna	The ion exchange separation of uranium and thorium in non-aqueous and mixed media	8 400
72/US	Austria	First Physical Institute, University of Vienna	Investigation of the decay scheme of Tl-210 (RaC'')	4 000

a/ Explanation of abbreviations:
..R$_1$, ..R$_2$, ..R$_3$ - first, second, third renewal of contract;
../RB - financed from the Regular Budget;
../OB - financed from the Operational Budget;
../US - financed from funds provided by the United States of America.

b/ This contract was also mentioned in Annex XIII to the Board's Report to the General Conference for 1959-60 (GC(IV)/114), but entered into force during the period under review in the present report.

c/ Contract completed before 30 June 1960.

d/ Total cost, including that of renewals.

ANNEX XV

REFERENCES TO PUBLICATIONS REPORTING RESULTS OF WORK DONE UNDER AGENCY RESEARCH CONTRACTS[a]

Publication	Contract number[b]
1. K. Liebscher and T. Schönfeld: Messung der Radioaktivität Oberflächenwässern mit dem Gammaspektrometer. Wasser und Abwasser, Vol. Tagesfragen der Abwasserwirtschaft, p. 1 (1959). (Determination of the radioactivity of surface waters using a gamma spectrometer).	1
2. T. Schönfeld, K. Liebscher, F. Karl and C. Friedmann: Radioactive Fission Products in Lungs. Nature, Vol. 185, p. 192 (1960)	1
3. J. Pany: Zur Strahlenschädigung von DNS-Synthese und Mitose. Z. Biologie, Vol. 3, p. 401 (1960). (On radiation damage to DNS-synthesis and mitosis).	3
4. L. Stevens and L. A. Stocken: Thymine and Uracil Catabolism in Foetal and Young Rat Liver. Biochemical and Biophysical Research Communications, Vol. 3, p. 155 (1960)	35
5. A. Lengerova: Polyvalent Immunological Tolerance in Homologous Radiation Chimaeras. Nature, Vol. 187, p. 160 (1960)	34
6. F. Habashi and T. Schönfeld: Feststellung der Freisetzung "frischer" Spaltprodukte in die Biosphäre durch Gamma-Spektrometrie. Atompraxis, Vol. 6, p. 414 (1960). (Determination of the liberation of "fresh" fission products into the biosphere, using gamma spectrometry).	1
7. R. Biebl: Die Pflanzenzelle als Objekt zur Prüfung chemischer Strahlenschutzstoffe. Anzeiger der math.-naturw. Klasse der Oesterreichischen Akademie der Wissenschaften, No. 2, p. 24 (1960). (The plant cell as an object to test chemical radiation protection substances).	14
8. R. Biebl, W. Url and G. Janeček: Untersuchungen über Strahlenschutz an Pflanzenzellen. I. Schutzwirkung des Thioharnstoffes gegen kurzwellige UV-Strahlen. Protoplasma, Vol. 53, p. 321 (1961). (Radiation protection research using plant cells. I. Protective effect of thiourea against short-wave ultraviolet rays).	14
9. P. Czerniak and E. Lubin: L'exploration du foie avec les radio-isotopes par une technique stéréométrique. Hepatoscannographie en trois plans. Tijdschrift voor Gastro-Enterologie, Vol. 4, p. 42 (1961). (The exploration of the liver with radioisotopes using a stereometric technique. Hepatoscannography in three planes).	54
10. P. Heistracher, O. Kraupp and B. Pillat: Effects of X-Irradiation on Papillary Muscle of the Cat. Nature, Vol. 188, p. 413 (1960)	2

Publication	Contract number[b/]
11. B. Pillat and P. Heistracher: Veränderungen von Leitungsgeschwindigkeit und Latenz am Papillarmuskel der Katze während des Refraktärstadiums. Pflügers Arch., Vol. 271, p. 564 (1960). (Changes in conductive velocity and latency in the papillary muscle of the cat during the refractory period).	2
12. K. Liebscher, F. Habashi and T. Schönfeld: Beobachtungen über das Verhalten von Spaltprodukten in Oberflächenwässern. Atompraxis, Vol. 7, p. 94 (1961). (Observations on the behavior of fission products in surface waters).	1
13. K. Tensho, K.-L. Yeh and S. Mitsui: The Uptake of Strontium and Cesium by Plants from Soil With Special Reference to the Unusual Cesium Uptake by Lowland Rice and its Mechanism. Soil and Plant Food, Vol. 6, p. 176 (1961)	21
14. G. A. van Arkel, J. H. van de Pol and J. A. Cohen: Genetic Recombination and Marker Rescue of Urea-disrupted Bacteriophage T4 in Spheroplasts of E. coli. Virology, Vol. 13, No. 4 (1961)	51
15. J. H. van de Pol, G. Veldhuisen and J. A. Cohen: Phage Transformation: A New Criterion for the Biological Activity of Bacteriophage DNA. Biochim. Biophys. Acta, Vol. 48, p. 417 (1961)	51

a/ Extensive summaries of the final reports on the results of work done under research contracts completed during the preceding year are being published annually. The first collection of summaries covering reports completed up to 31 December 1960 is being issued under the title IAEA Research Contracts (STI/DOC/10/4).

b/ For the exact titles of the contracts, see document GC(IV)/114, Annex XIII.