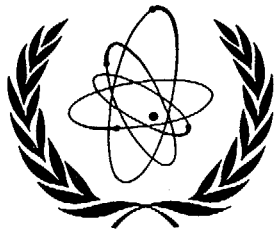
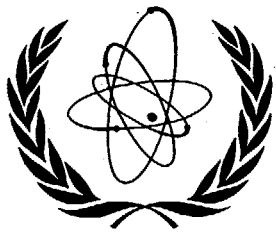


International Atomic Energy Agency

ANNUAL REPORT TO THE ECONOMIC AND SOCIAL COUNCIL OF THE UNITED NATIONS FOR 1961-62



International Atomic Energy Agency

ANNUAL REPORT TO THE ECONOMIC AND SOCIAL COUNCIL OF THE UNITED NATIONS FOR 1961-62

INFCIRC/35

Printed by the
International Atomic Energy Agency
in Austria - May 1962

THE AGENCY'S ANNUAL REPORT TO THE ECONOMIC AND SOCIAL COUNCIL OF THE UNITED NATIONS FOR 1961-62

The text of the Agency's annual report to the Economic and Social Council of the United Nations for 1961-62 is reproduced in this document for the information of all Members.

ANNUAL REPORT BY THE INTERNATIONAL ATOMIC ENERGY AGENCY TO THE ECONOMIC AND SOCIAL COUNCIL FOR 1961-62

(For the period 1 April 1961 - 31 March 1962)

CONTENTS

	Paragraphs
INTRODUCTION	1 - 11
General	1 - 6
Programme appraisal	7 - 8
Co-ordination	9 - 11
CHAPTER I. SCIENTIFIC AND TECHNICAL WORK	12 - 57
1. Nuclear power, reactors, fuels and materials	12 - 23
(a) Power reactors	14 - 15
(b) Problems in using research reactors	16
(c) Nuclear physics and reactor research	17 - 21
(d) Reactor fuels and equipment	22 - 23
2. Radioisotopes and radiation	24 - 38
(a) Medicine	25 - 28
(b) Agriculture	29 - 34
(c) Industry	35
(d) Hydrology	36
(e) Radiation standards	37 - 38
3. Protection against radiation	39 - 57
(a) Research on radiation effects	41 - 45
(b) Research on the safe disposal of radioactive wastes in the environment	46 - 47
(c) Radiation protection services	48 - 51
(d) Regulatory and legal work	52 - 57
(i) Basic safety standards	52
(ii) Transport regulations	53
(iii) Guides and codes of practice	54
(iv) Control of waste disposal	55
(v) Civil liability	56 - 57

CONTENTS (continued)

		Paragraphs
CHAPTER II.	PROGRAMMES AND ACTIVITIES	58 - 82
1.	Technical assistance	58 - 74
	(a) Resources	58 - 62
	(b) Trends and developments in the technical assistance programmes	63 - 66
	(c) Training	67 - 72
	(d) Provision of experts	73 - 74
	(e) Supplies of equipment	75
2.	Exchange of information	76 - 80
3.	Research and development	81 - 82

ANNEXES

ANNEX I	CONTRIBUTIONS TO THE GENERAL FUND FOR 1962
ANNEX II	TECHNICAL ASSISTANCE OFFERED OR PROVIDED BY MEMBER STATES IN 1961 FREE OR PARTIALLY FREE OF CHARGE
ANNEX III	1961 FELLOWSHIP PROGRAMME
ANNEX IV	CONFERENCES, SEMINARS AND SYMPOSIA IN 1961 AND 1962
ANNEX V	AGENCY PUBLICATIONS
ANNEX VI	RESEARCH CONTRACTS

List of Abbreviations

ACC	Administrative Committee on Co-ordination
Agency	International Atomic Energy Agency
Board	Board of Governors of the International Atomic Energy Agency
ECAFE	Economic Commission for Asia and the Far East of the United Nations
ECE	Economic Commission for Europe of the United Nations
ECLA	Economic Commission for Latin America of the United Nations
ECOSOC	Economic and Social Council of the United Nations
EPTA	United Nations Expanded Programme of Technical Assistance
FAO	Food and Agriculture Organization of the United Nations
IANEC	Inter-American Nuclear Energy Commission of the Organization of American States
ICRU	International Commission on Radiological Units and Measurements
IMCO	Inter-Governmental Maritime Consultative Organization
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. The following report is submitted to ECOSOC in pursuance of Council resolution 694 E (XXVI) and resolutions GC(II)/RES/24 and GC(V)/RES/90 of the General Conference of the International Atomic Energy Agency.

2. The main developments in the Agency's scientific and technical work during the last year, which are thought to be of interest to ECOSOC, are described in Chapters I and II. Additional information about the Agency's programme as a whole is given in the comprehensive annual report to the General Assembly of the United Nations [1].

3. The membership of the Agency has increased from 74 to 77 in the past year, the three new Members being Congo (Leopoldville), Lebanon and Mali.

4. The Board of Governors and the General Conference have approved an amendment to the Agency's Statute to provide for the more equitable representation on the Board of the area of Africa and the Middle East. The amendment will come into force upon acceptance by two thirds of the Agency's Members.

5. After appointment by the Board and approval by the General Conference, Mr. Sigvard Eklund took up office as Director General, in succession to Mr. Sterling Cole, on 1 December 1961.

6. The Programme and Budget for 1962 [2] provides for the expenditure of $6 261 000 under the Regular Budget, compared with $6 168 000 in 1961, and sets a target of $2 million for voluntary contributions to the General Fund, compared with $1.8 million in 1961. By 31 March 1962, pledges of voluntary contributions to the General Fund for 1962 amounted to a total of $1 136 402. Details concerning these contributions are set forth in Annex I.

Programme appraisal

7. The Agency's activities have continued in general to follow the lines set forth in the Agency's contribution to the Five Year Perspective 1960 - 1964 [3]. The growth which was forecast for the Agency's technical assistance programme has been hampered by shortage of funds. [4] A number of new nuclear power stations have come into operation during the past year in technically advanced countries and certain developing countries are showing interest in specific projects for nuclear power plants, as well as in broad national surveys of nuclear power prospects. It is expected that a number of such plants will come into operation in the developing areas in the late 1960s and this will require a good deal of preparatory work in the next few years. The General Conference has asked that preparation of a long-term programme for the Agency's activities be initiated, which should have regard to the difficulties of financing the Agency's operational programme.

8. In elaborating this programme the recommendations on matters within the Agency's competence, made by Professor Auger in the survey entitled Current Trends in Scientific Research, will be borne in mind. As indicated to ECOSOC last year [5], the Agency is already giving effect to some of these recommendations.

---

[1] United Nations document A/4883, and Add.1.

[2] Document GC(V)/155.

[3] United Nations document E/3347/Rev.1.

[4] See paragraphs 59, 60 and 63 below.

[5] United Nations document E/3488/Add.1.

Co-ordination

9. The relationship agreement between the Agency and IMCO entered into force on its approval by the General Conference on 5 October 1961. The General Conference also approved an Executing Agency Agreement between the Agency and the United Nations Special Fund. [6]

10. The programmes of certain of the specialized agencies and that of the Agency in subjects of mutual interest are continuing to increase, and concern about the co-ordination of this work has been expressed in ECOSOC, as well as in the Board. The Agency informed ECOSOC last year that consideration was being given to the improvement of inter-secretariat consultation, particularly to facilitate early, joint planning of programmes in similar or related fields. Standing inter-secretariat working groups have therefore now been established between the Agency and FAO, and the Agency and WHO, for the purpose of planning and reviewing work of mutual interest and reaching agreement on the allocation, in appropriate cases, of responsibility for specific projects or subjects. The first meetings of these working groups have taken place and it would appear that they will provide suitable machinery for more effective co-ordination. The question of co-ordination as a whole of the activities of all members of the United Nations family relating to the peaceful uses of atomic energy will be reported on separately by ACC.

11. The Agency has continued to co-operate closely with UNSCEAR and has provided that body with a number of technical reports. The Board is also considering the question of co-operation with WMO and UNSCEAR in the implementation of General Assembly resolution 1629 II (XVI) regarding the measurement of atmospheric radioactivity. The Board has noted that no decision has been taken by the General Assembly with regard to the holding of a third United Nations international conference on the peaceful uses of atomic energy.

CHAPTER I. SCIENTIFIC AND TECHNICAL WORK

1. Nuclear power, reactors, fuels and materials

12. During the year there has been an increase in the interest of Member States in undertaking or studying the possibilities of undertaking nuclear power projects with the Agency's help. At the same time the Agency has received indications of the problems faced by a number of Member States in making full use of research reactors that have recently come into operation or that will shortly do so. These matters are being approached by the Agency in various ways.

13. The General Conference, at its fifth regular session, adopted one resolution on nuclear power projects and another on research reactors.[7] In the first resolution it requested that help be given to developing countries to implement nuclear power programmes and asked the Board and the Secretariat to study and advise on regional and international demonstration nuclear power projects. In the second, it requested that steps be taken to promote co-operation between technically advanced and developing countries, so as to make full use of research reactors in the latter.

(a) Power reactors

14. In June 1961 an Agency mission made a preliminary survey of the possibility of establishing a demonstration power reactor in Yugoslavia, which might be designed, built and operated as an international enterprise. The mission's preliminary assessments of the technical aspects of the project were favourable. Another mission visited Pakistan in January 1962 to evaluate the prospects of nuclear power in that country and to review a study prepared on the subject by the Pakistan Atomic Energy Commission and its engineering consultants. The work of a third mission undertaken in 1960 [8] has been published in a report on the prospects of nuclear power in the Philippines [9], which shows that a 200 MW nuclear power plant, coming into operation in 1967-68 in the Manila area, might be economically competitive with an oil-fired station of the same size. It must be stressed, however, that the projects referred to are still at an early stage and that many problems, particularly of financing the projects internationally, have yet to be considered. A report will be submitted to the General Conference at its sixth regular session.

15. The Agency also published a general review of nuclear power costs [10], a report on the methods of determining generating costs [11], and a summary of information on small power reactors being built in the United States of America [12]. Furthermore, the Agency contributed survey papers on nuclear power costs and regional power problems to two technical seminars organized respectively by ECLA in Mexico City in July 1961, and by ECAFE in Bangkok in December 1961.

---

[7] General Conference resolutions GC(V)/RES/109 and 106 respectively.

[8] United Nations document E/3490, paragraph 49. (Issued by the Agency as INFCIRC/28.)

[9] Prospects of Nuclear Power in the Philippines, Agency publication No. STI/DOC/10/3.

[10] Document GC(V)/INF/38.

[11] Introduction to the Methods of Estimating Nuclear Power Generating Costs, Agency publication No. STI/DOC/10/5.

[12] Document GC(V)/INF/41.

(b) Problems in using research reactors

16. It is estimated that there are at present over 200 research reactors in operation or being constructed throughout the world, 25 of which are in developing countries. Many reactor centres are experiencing difficulties in finding scientific and technical personnel to make full use of the reactors, operate them safely and plan programmes for reactor experiments. In one case, for example, it was necessary to shut down a reactor temporarily. The Agency is endeavouring to help overcome these difficulties through its training and technical assistance programme. In October 1961 the Agency also organized a Symposium on the Programming and Utilization of Research Reactors, which stimulated much interest in arranging direct co-operation between well-established and new centres and showed the need for a number of smaller meetings to discuss the subject in greater detail.

(c) Nuclear physics and reactor research

17. The Agency has continued to promote advanced nuclear research by collecting and publishing information and arranging scientific meetings. It has also arranged for scientists from both developing and technically advanced countries to undertake advanced reactor physics research through participation in the NORA research project, which is being organized jointly by the Agency and the Norwegian Government. [13]

18. Four scientific meetings on various types of nuclear physics and reactor research were held during the past year including the Symposium on the Programming and Utilization of Research Reactors, referred to in paragraph 16 above.

19. A Conference on Plasma Physics and Controlled Nuclear Fusion Research, held in Salzburg, Austria, in September 1961, attracted wide interest, and many eminent scientists numbered among the 473 participants. One hundred and nine papers were presented (31 each from the Union of Soviet Socialist Republics and the United States, 14 from the United Kingdom of Great Britain and Northern Ireland, 12 from the Federal Republic of Germany and 11 from France), which covered all aspects of the programmes now being undertaken for the eventual development of useful energy from controlled nuclear power. The participants recommended that a similar conference should be held in 1964.

20. Two more specialized meetings were held in August and October 1961 in Vienna: a Seminar on the Physics of Fast and Intermediate Reactors and a Symposium on Power Reactor Experiments. The latter dealt mainly with reactor concepts still at an experimental stage.

21. With the advice of a panel of experts a special study is being made of the ways in which the Agency can supplement and co-operate in the work already being undertaken by various scientific groups for international co-ordination of nuclear measurements and for the critical analysis and compilation of all types of nuclear data.

(d) Reactor fuels and equipment

22. The Agency's programme under this heading has continued to be modest. Four new projects for the supply of reactors and fuel were approved in the past year, namely for the transfer of three small research reactors and their fuel from the United States to various institutions in Yugoslavia, and of a 5 MW swimming-pool reactor from the United States to Pakistan. Member States have also offered to supply further quantities of source and fissionable materials to the Agency, usually at current market prices.

---

[13] The zero power reactor facility NORA, which first reached criticality on 29 June 1961, has been made available by the Norwegian Government for use in the research programme, and the United States Government is providing one of the fuel charges for the reactor. (See also United Nations document E/3490, paragraph 52.)

23. In May 1961 the Agency held a Conference on Nuclear Electronics in Belgrade to exchange information on progress in developing specialized nuclear instruments. A small exhibition of advanced scientific equipment was arranged at the same time.

2. Radioisotopes and radiation

24. The number of uses of radioisotopes and radiation has continued to increase and the Agency has continued to give special attention, in co-operation with the specialized agencies concerned, to promoting their medical and agricultural applications in the developing countries. Work has also begun in the Agency's Laboratory and work in the field has continued on the study of various hydrological problems. Scientific research and the exchange of information have been promoted by a number of scientific meetings, the award of research contracts and preparation of reviews.

(a) Medicine

25. As previously noted [14], the first practical application of atomic energy in many developing countries is the medical use of isotopes in diagnosis, therapy or research. Much of the Agency's technical assistance programme is therefore concerned with this subject. In 1961, in addition to granting 42 individual fellowships, the Agency held a regional training course, attended by 18 students, on the medical applications of radioisotopes in the United Arab Republic in November and December 1961. Experts on medical applications were working in ten developing Member States, and medical research under seven contracts has been in progress in six Member States of which five were in the developing areas. The research programme on the production and use of the isotope calcium-47, which is of particular medical importance, has continued. Special attention is now being paid to research on tropical or sub-tropical diseases, on which WHO has been asked to give advice.

26. Two scientific meetings were concerned with medical subjects. The first, a Symposium on Whole Body Counting, which took place in Vienna from 12 to 16 June 1961, dealt with the problems and techniques of measuring radioactivity in the body resulting from occupational, clinical or accidental exposure. The second, a Conference on the Use of Radioisotopes in Animal Biology and the Medical Sciences, held jointly by the Agency, FAO and WHO in Mexico City in November/December 1961, served as a complement to the Conference on the Use of Radioisotopes in the Physical Sciences and Industry, organized jointly by the Agency and UNESCO in Copenhagen in September 1960.

27. With regard to meetings of medical consultants, mention should be made of the Study Group on Standardization of Radiological Dosimetry for Radiation Beams which was convened by WHO, ICRU and the Agency at Geneva in April 1961. Further medical work included the dispatch of a special isotope mission which, in January and February 1962, visited institutes in Greece, Iran, Iraq, Sudan, Turkey and the United Arab Republic. The purpose of the mission was to promote co-operation between the institutes both in their work on radiation therapy with radiocobalt units and in treating certain types of diseases common to the area.

28. The Agency is also trying to promote internationally the standardization and calibration of measurements of radioiodine concentration in the thyroid gland, as one of the most widespread clinical uses of radioiodine is in diagnosing and treating disorders of the thyroid.

(b) Agriculture

29. The Agency's technical assistance and research programmes on the agricultural uses of isotopes and radiation have grown in variety and scope during the past year.

---

[14] United Nations document E/3490, paragraph 66.

30. In 1961, fellowships were awarded to 31 scientists in agricultural applications of isotopes, and the Agency and FAO held jointly two international training courses in Wageningen in the Netherlands, in April/May and September/October 1961, at which 30 students were instructed in the use of radioisotope techniques for studying the relationship between soils and plants in agricultural and forestry research.

31. Agency experts have been working in eight developing Member States, and research under five contracts has been in progress in four Member States. Studies are being undertaken mainly on:

(i) The relationship between types of soil, fertilizers and plant growth;

(ii) The control of insect pests and other entomological problems;

(iii) The improvement of crop production, for instance, by developing new varieties of crops;

(iv) Animal diseases and animal physiology;

(v) Methods of improving milk and meat production; and

(vi) The development of practical methods of using radiation to preserve sterilized foodstuffs.

32. Most of this research is taking place under the guidance of special panels of experts, in which FAO has participated. Two panels are, for example, studying the extent to which isotope techniques can be used in solving special agricultural problems: one is studying the agricultural problems of Africa, and the other those of rice-growing areas.

33. Three scientific meetings in the period under review dealt with agriculture. The first was held in October 1961 in Brussels, when the Agency joined FAO and WHO in sponsoring a Technical Meeting on the Evaluation of the Wholesomeness of Irradiated Foods. It was recommended that the three organizations establish joint machinery to promote further work on this subject, in particular by means of experiments on animals to test the wholesomeness of food preserved by radiation. The second, a Conference on the Use of Radioisotopes in Animal Biology and the Medical Sciences, has been referred to in paragraph 26 above.

34. The third was a Symposium on the Use of Radioisotopes in Soil-Plant Nutrition Studies, organized jointly by the Agency and FAO in Bombay in February/March 1962. The symposium reviewed the use of new isotope techniques for studying such questions as soil chemistry and physics, the synthesis and disintegration of organic matter in soil, and the absorption of fertilizers by plants.

(c) Industry

35. Most of the industrial techniques for using isotopes and radiation - e.g. thickness gauging, leak detection, measurement of the flow of liquids, oil well logging, radiography, production control - are well-developed commercial applications rather than matters for scientific research, and the main work of the Agency has been to continue the two industrial surveys reported last year. [15] The first, a systematic survey of radioisotope applications in industry, has been completed, and the second, an international survey of industrial savings achieved by using radioisotopes, is still at a preliminary stage.

(d) Hydrology

36. The world-wide survey of the concentration of hydrogen and oxygen isotopes in rain waters [16], undertaken in collaboration with WMO, has been continued. The Agency is considering making a similar survey of these isotopes in river water. Hydrological studies of ground-water resources, by means of tracers, are being undertaken in Greece

[15] Ibid., paragraphs 81 and 82.

[16] Ibid., paragraph 88.

as previously reported [16] and in the vicinity of Trieste on the Italian-Yugoslav frontier, and their possible use in water resources development in East and West Pakistan is being investigated. Plans have also been submitted to the Committee for the Co-ordination of Investigation of the Lower Mekong Basin for using radioisotopes to trace sand and silt movements in the Tonle Sap - Great Lake region of Cambodia.

(e) Radiation standards

37. In January 1962, the Agency's Laboratory at Seibersdorf began to distribute radioactive reference sources to Member States. This service will enable laboratories, hospitals and clinics using radioisotopes for medical, biological and industrial uses to calibrate their measuring instruments.

38. The Agency has continued to co-operate with the International Bureau of Weights and Measures and with laboratories in Belgium, the Czechoslovak Socialist Republic, the Federal Republic of Germany, Hungary and Poland in developing and improving methods of measuring absolute activity by inter-laboratory comparisons of various nuclides.

3. Protection against radiation

39. The relatively rapid growth in the number of facilities, such as nuclear power research and reactors, hospitals, etc., where radiation hazards may arise, and increasing international concern about the effects of all types of ionizing radiation have continued to make protection against radiation hazards one of the Agency's main concerns. During the past year its work on this subject has ranged from support of research on the effects of radiation to the preparation of international conventions on the legal aspects of nuclear incidents.

40. Plans are also being worked out for co-operation with WMO and UNSCEAR under resolution 1629 II (XVI) of the United Nations General Assembly for establishing a world-wide system for reporting measurements of radioactivity in the atmosphere.

(a) Research on radiation effects

41. The Agency's research programme on this subject is being guided by a study group of leading radiobiologists at which WHO and UNESCO are also represented. During 1961 research has been in progress under 27 contracts in institutions in 14 Member States. The main subjects of research include the mechanism of radiation damage to cells and at the sub-cellular level, means of increasing or changing natural resistance to radiation and the preservation of drugs and biosynthetic products by radiation.

42. The training and technical assistance given under this heading included an advanced international training course on the biological effects of radiation, held near Rehovoth in Israel from October 1961 to February 1962, which was attended by 20 students, and an international course on radiation health and safety held in Chiba City, Japan, in October/November 1961, attended by 20 students. In 1961, 35 fellowships in health physics were awarded.

43. The Agency held a Symposium on the Effects of Ionizing Radiation on the Nervous System, in Vienna in June 1961, which reviewed the latest research on the effects of radiation exposure of the peripheral and central nervous system. Knowledge of these effects is expected to help in assessing the risk of radiation exposure and thus help to provide a basis for radiation safety codes.

44. The Agency also contributed substantially to two other meetings dealing with research on radiation effects. It co-sponsored one section of the Fifth International Biochemistry Congress held in Moscow in August 1961, which dealt with the effect of radiation on biochemical processes. The second meeting was a Symposium on Cellular Basis and Aetiology of Late Somatic Effects of Ionizing Radiations, held jointly by UNESCO and the Agency in London in March 1962. This dealt with the effects of radiation in causing cancer and leukaemia, shortening the life span, and with the effectiveness of protective measures against delayed somatic damage.

45. The Agency is co-operating with Finnish, Norwegian and Swedish experts and the Finnish Government in investigating the effects of high concentrations of radioactive nuclides in the staple diet of certain parts of the population of Scandinavia.

(b) Research on the safe disposal of radioactive wastes in the environment

46. Countries beginning programmes using atomic energy for peaceful purposes must make arrangements to dispose of radioactive waste from isotope laboratories and research reactors. Research under Agency contracts on this subject, which is in progress in nine countries, has, therefore, been designed primarily to find cheap ways of treating such waste and to ascertain the effects of small releases of waste into the environment.

47. Under the Agency's special three-year research programme in Monaco, studies are being made with the help of the Oceanographic Institute in Monaco on subjects such as the movement of radionuclides and their concentrates in organisms as well as their effects upon the organisms. Similar research is being supported in other Mediterranean countries and joint projects for research and training in oceanography are being prepared in consultation with the interested specialized agencies in the ACC Sub-Committee on Oceanography.

(c) Radiation protection services

48. Special radiation protection guidance and services are now being provided in many forms. The Laboratory carried out environmental contamination studies at the request of four Governments and completed and submitted to UNSCEAR a survey on strontium-90 and caesium-137 in food consumed in Austria. The Agency's staff has advised the Sudan and the United Arab Republic on setting up equipment for measuring environmental radioactivity.

49. In December 1961, a Seminar on the Agricultural and Public Health Aspects of Radioactive Contamination in Normal and Emergency Situations was arranged jointly by FAO, WHO and the Agency in Scheveningen in the Netherlands. Agricultural and public health authorities were given guidance on the means of assessing and dealing with contamination problems.

50. Work is also progressing on making arrangements for emergency assistance to be given to any country in which a nuclear accident may occur. FAO, WHO and the League of Red Cross Societies have agreed to collaborate.

51. Under the heading of "reactor safety" the Agency is making a survey of different types of reactor accidents and incidents, is continuing its work to establish criteria for safely locating reactors and nuclear plants, and convened a group of experts in June 1961 to study the problems that will arise from the entry of nuclear merchant ships into commercial harbours.

(d) Regulatory and legal work

(i) Basic safety standards

52. The Agency's draft basic safety standards were further reviewed by a panel of experts, and comments of Member States and international organizations were taken into account. The draft standards, as modified [17], will be considered by the Board in June 1962. These basic standards are intended to apply to operations undertaken or supported by the Agency and to serve as a basis for national regulations on radiation protection.

---

[17] Ibid., paragraphs 113 and 114.

(ii) Transport regulations

53. The Agency's Regulations for the Safe Transport of Radioactive Materials, [18] published in May 1961, have since been incorporated by the United Nations Committee of Experts for Further Work on the Transport of Dangerous Goods in its recommendations to ECOSOC. They have also been extensively incorporated in the International Regulations Concerning the Carriage of Dangerous Goods (RID) [19] and taken into account by the Customs Co-operation Council. The latter body is co-operating with the Agency in preparing a classification of nuclear products for customs purposes. The Agency is co-operating with ECE in preparing a draft agreement on the transport of radioactive materials by inland waterways, and there have been informal consultations with the International Commission for the Navigation of the Rhine, which is preparing regulations for the transport of such materials on that river.

(iii) Guides and codes of practice

54. The following publications are being prepared:

(a) A manual on the use of film badges for personnel monitoring;

(b) A manual on the design of safe radioisotope laboratories; and

(c) A directory of existing whole body monitors.

(iv) Control of waste disposal

55. Under the guidance of various panels of experts, regulatory work has continued on the following projects:

(a) Problems of disposal of radioactive waste into fresh water;

(b) A manual on the safe disposal of radioactive wastes by small-scale users;

(c) Methods of monitoring waste disposal into the sea and the question of standardizing the sampling and analysis of radionuclides in sea water and in marine products;

(d) International measures (organizational, administrative and legal) that might be taken concerning the disposal of radioactive waste into the sea [20]; and

(e) Methods of treating radioactive wastes before storage instead of discharging them into the environment.

(v) Civil liability

56. The draft International Convention on Minimum International Standards Regarding Civil Liability for Nuclear Damage was revised by an inter-governmental committee in Vienna in May 1961. In March 1962 the Board authorized the Director General to convene a Diplomatic Conference on Civil Liability for Nuclear Damage, in Buenos Aires early in 1963, on the understanding that the inter-governmental committee would be re-convened before that date in order to review the text of the draft convention to be submitted to the Diplomatic Conference.

57. Another draft convention, on the liability of the operators of nuclear ships, was discussed at the Diplomatic Conference on Maritime Law, held in Brussels in April 1961. The Agency co-sponsored this item of the agenda with the Belgian Government. The Conference reached agreement on most of the articles of the draft convention and decided to convene an ad hoc session to complete and adopt it. The ad hoc Diplomatic Conference will be convened in May 1962, and the necessary documentation is being prepared by a standing inter-governmental committee.

---

[18] Agency publication No. STI/PUB/40.

[19] These Regulations constitute Annex I of the International Convention concerning the Carriage of Goods by Rail (CIM).

[20] See United Nations document E/3490, paragraph 117.

CHAPTER II. PROGRAMMES AND ACTIVITIES

1. Technical assistance

(a) Resources

58. The Agency's technical assistance programme has continued to rely on three types of resources:

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

(ii) Funds allocated to the Agency through EPTA; and

(iii) Fellowships, equipment and the services of experts provided completely or partially free of charge by Member States.

59. Resources available for technical assistance activities of the Agency in the last three years are shown in Table I below:

Table I

Source	1959	1960	1961
	$	$	$
Monetary resources			
Funds available from the Agency's own resources (General Fund)	798 408	1 044 702	1 015 691
Financial authorizations from EPTA[a/]	304 580	639 362	808 614
TOTAL	1 102 988	1 684 064	1 824 305
Resources in kind			
Estimated value of cost-free fellowships	561 500	807 000	748 771
Estimated value of gifts of equipment	-	192 000	110 000
Experts	b/	b/	b/

a/ Includes normal earmarkings, re-allocations to cover previous year's contractual commitments, and Working Capital Reserve Fund authorizations as revised at the end of each year.

b/ The services of experts have been provided free of charge by various Member States, the value of which is not normally estimated by the Governments concerned.

60. Table I above shows that funds available from the Agency's own resources, which are provided from voluntary contributions to the General Fund, are the largest single source for financing the Agency's technical assistance programme. Contributions to the General Fund have, however, consistently failed to reach the targets set by successive sessions of the General Conference, as is shown in Table II below.

Table II

	1959	1960	1961
	$	$	$
Target for voluntary contributions	1 500 000	1 500 000	1 800 000
Amount pledged	1 183 044	996 103	1 261 750
Budgeted for technical assistance	1 100 000	1 367 000	1 361 000
Actually available for technical assistance	798 408	1 044 702	1 015 691

61. The funds allocated to the Agency for 1961/62 from EPTA amount to $1 500 769, of which $110 150 are set aside for regional projects, and $89 900 are being used by the Agency for its programme in Africa. In this latter connection the Agency has borne in mind the terms of ECOSOC resolution 768 (XXX).

62. Technical assistance offered or provided in 1961 free or partially free of charge by individual Member States for use by the Agency in 1961 is shown in Annex II to this report. The Annex covers offers of fellowships and subsequent awards, numbers of experts provided and gifts of equipment.

(b) Trends and developments in the technical assistance programmes

63. Demands on the programme have continued to grow rapidly and to exceed the resources available. The wide gap between pledges to the General Fund and the targets set has made it difficult even to carry out approved projects, although special contributions have alleviated this situation to some extent. Consequently, the General Conference adopted resolution GC(V)/RES/100 at its fifth regular session, inviting economically developed Member States to make voluntary contributions to the General Fund for 1962 and succeeding years in amounts that were at least the same percentages of the target for each year, as were their percentage contributions to the Regular Budget, and the other Members to demonstrate their continued support of the Agency by making each year at least a token contribution to the General Fund. A list of contributions which have so far been pledged and paid to the General Fund for 1962 is given in Annex I.

64. As in previous years, the Agency has sent composite expert missions to Member States to prepare the way for technical assistance programmes; eight countries in Africa and Latin America were visited by two such missions during 1961.

65. Table III below shows in detail the use of funds for technical assistance in the last three years, excluding gifts in kind.

Table III

Cost of technical assistance provided in the years 1959/61 from both Agency and EPTA funds[a]

(Expressed in thousands of United States dollars)

Type of assistance	1959				1960				1961			
	Agency	EPTA	Total	Percentage	Agency	EPTA	Total	Percentage	Agency	EPTA	Total	Percentage
Experts	13.1	26.2	39.3	5.6	210.5	193.7	404.2	26.6	236.0	269.4	505.4	35.7
Equipment	6.1	15.0	21.1	3.0	87.9	78.4	166.3	11.0	130.0	31.8	161.8	11.4
Fellowships	351.9	221.7	573.6	81.8	524.2	270.1	794.3	52.4	375.6	92.8	468.4	33.1
Research fellowships	12.6	-	12.6	1.8	14.8	-	14.8	1.0	41.2	-	41.2	2.9
Visiting professors	24.3	1.5	25.8	3.7	97.9	2.0	99.9	6.6	92.7	2.6	95.3	6.7
Training courses	15.9	-	15.9	2.3	8.0	-	8.0	0.5	70.9	51.4	122.3	8.6
Mobile radioisotope laboratories	12.7	-	12.7	1.8	28.9	-	28.9	1.9	20.7	2.2	22.8	1.6
TOTAL	436.6	264.4	701.0	100.0	972.2	544.2	1516.4	100.0	967.1	450.2	1417.3	100.0

a/ It should be noted that the figures show actual expenditures in each of the three years plus the unliquidated obligations for each of these years, that were still outstanding at the end of 1961.

66. Gifts in kind do, nevertheless, form an important part of the total assistance which can be provided through the Agency. Certain trends in the technical assistance programmes in the last three years, taking into account gifts in kind, are indicated in Table IV below. It will be noted that the percentages for fellowships shown here are considerably greater than in Table III; this is because offers of free fellowships have constituted a large part of the fellowship programme.

Table IV

Type of assistance	1959	1960	1961
	%	%	%
Fellowships	89.9	63.7	53.5
Equipment	1.7	14.2	11.9
Experts and other assistance	8.4	22.1	34.6

(c) Training

67. Under the 1961 programme 370 candidates were selected for fellowship awards as compared with 468 in 1960. After subsequent withdrawals 344 fellowships were actually awarded in 1961. A chart showing the national origin of students and their place of study is given in Annex III. It will be seen that the students came from 44 Member States and were granted awards to study in 26 Member States.

68. In addition, 11 research and special grants were made under the 1961 programme to enable advanced research workers to undertake research at leading nuclear centres or to make study tours.

69. Under the 1961 programme, 19 visiting professors were sent to 11 Member States, compared with 17 visiting professors under the 1960 programme.

70. Six regional or international training courses were held in 1961 compared with two in 1960. Three of the 1961 courses - two in the United Arab Republic [21] and one in Israel [22] - were financed from EPTA funds. Of the remaining three, one was co-sponsored by WHO and held in Japan [22] and two by FAO and held in the Netherlands [23].

71. A Regional Seminar for Latin America on Educational Problems of Nuclear Energy, organized jointly by the Agency, UNESCO and IANEC in November 1961 in San Carlos de Bariloche, Argentina, was attended by 47 participants from 18 countries.

72. During 1961 the Agency's two mobile radioisotope laboratories provided general instruction on radioisotope techniques in Argentina, Brazil, China (Taiwan), Indonesia, the Philippines and Uruguay.

(d) Provision of experts

73. During 1961, 78 technical assistance experts (in addition to the 19 visiting professors mentioned in paragraph 69 above) were working on Agency projects in Member States. In Table V they are classified according to field of activity.

Table V

Field of activity	Number of experts		Number of visiting professors
	Agency's resources	EPTA	
Atomic energy (general)	-	2	-
Prospecting, mining and processing of nuclear raw materials	6	9	-
Fabrication and reprocessing of nuclear fuels	2	1	-
Nuclear research laboratories and centres	-	2	-
Nuclear research, scientific studies and laboratory services	2	4	15
Nuclear reactors	1	3	2
Applications of radioisotopes:			
Agriculture	4	4	-
Medicine	10	13	2
Miscellaneous	1	3	-
Health, safety and waste disposal	4	7	-
TOTAL	30	48	19

[21] See paragraph 25 above. An earlier course, on general applications of radio-isotopes, held in Cairo in March/May 1961, was attended by 20 students.

[22] See paragraph 42 above.

[23] See paragraph 30 above.

74. The Agency continues to experience serious problems in recruiting qualified technical assistance experts, especially for long-term assignments in the field.

(e) Supplies of equipment

75. Under the technical assistance programme, equipment to the value of $161 800 was supplied to 14 countries and to the value of $21 000 for regional training courses. This compared with $166 300 to 20 countries in 1960. In addition, certain equipment was offered to the Agency free of charge in 1961, to which reference is made in Annex II.

2. Exchange of information

76. Attendance at the scientific conferences, seminars and symposia organized by the Agency in 1961 was practically the same as in 1960, e.g. some two thousand scientists attended 12 meetings. A list of such meetings held in 1961 and planned for 1962 is given in Annex IV.

77. In accordance with resolution GC(V)/RES/107, adopted by the General Conference at its fifth regular session, the Agency is studying the possibility of establishing an international centre for theoretical physics. Arrangements are being made to organize a seminar on high energy physics in Trieste, Italy, in July/August 1962.

78. As in the past, scientific publications have comprised mainly reports on the proceedings of scientific meetings, recommendations, manuals on protection against radiation, and other technical material produced by the Secretariat. Four issues of the Agency's journal Nuclear Fusion: Journal of Plasma Physics and Thermo-Nuclear Fusion were published during the past year, and three special supplements on the proceedings of the Conference on Plasma Physics and Controlled Nuclear Fusion Research, held in Salzburg.[24] Twelve reviews prepared by leading scientists on various aspects of nuclear science were published in the Agency's Review Series, and four extensive bibliographies were published for general distribution. These and other scientific publications issued during the reporting period are listed in Annex V.

79. The Agency's library now contains some 54 000 acquisitions and has continued to provide bibliographic, reference, photocopying and other services to Member States on request.

80. The Agency is also preparing an educational film on the safe handling of radioisotopes in laboratories.

3. Research and development

81. Seventy-three research contracts (26 new contracts and 47 renewals) to the value of $575 944 were supported by the Agency in 1961, as compared with 69 (42 new contracts and 27 renewals) to the value of $502 577 in 1960.[25] Annex VI gives a breakdown by subject matter of the research contracts awarded or renewed during 1961. The various types of research supported are mentioned under the relevant headings describing the scientific work of the Agency. The programme as a whole was reviewed by the Agency's Scientific Advisory Committee and the Board early in 1961 and various recommendations regarding the direction of the programme were approved. In particular, it was decided that more emphasis should be placed on research in the applications of radioisotopes in agriculture, medicine and hydrology, likely to be of direct practical value to developing countries.

---

[24] See paragraph 19 above.

[25] An additional ten contracts to the value of $90 690 were awarded in 1960 from funds made available by the United States Government (see United Nations document E/3490, paragraph 159); in 1961, 11 additional contracts to the value of $157 344 were similarly financed by the United States Government.

82. The results of the first contracts awarded - in many cases the work requires two to three years for completion - are now becoming available and have been published in appropriate scientific journals.[26]

[26] Summaries of results of a number of completed contracts have also been published by the Agency under the title IAEA Research Contracts, First Annual Report.

ANNEX I

CONTRIBUTIONS TO THE GENERAL FUND FOR 1962

(as at 31 March 1962)

Member State	Amount pledged[a]	Amount paid[a]
	$	$
ARGENTINA	15 000[b]	-
AUSTRALIA	20 000	20 000
AUSTRIA	5 000	-
BRAZIL	18 800	18 800
BURMA	1 000	-
CANADA	57 000	-
CHINA	5 000	-
COLOMBIA	2 000	-
DENMARK	11 000	11 000
FINLAND	6 600	-
FRANCE	[c]	-
GERMANY, FEDERAL REPUBLIC OF	65 000	32 500
GHANA	[c]	-
GREECE	2 500	-
HOLY SEE	2 000	2 000
INDONESIA	2 000	-
IRAQ	2 000	2 000
ISRAEL	1 852	-
ITALY	[c]	-
JAPAN	28 000	-
KOREA, REPUBLIC OF	3 000	-
MEXICO	8 500	-
MONACO	42 816	-
NETHERLANDS	18 600	-
NORWAY	9 000	-
PAKISTAN	6 000	-
PHILIPPINES	4 000	-
PORTUGAL	3 600	3 600

Member State	Amount pledged[a/]	Amount paid[a/]
	$	$
SOUTH AFRICA	10 400	-
SWEDEN	25 600	-
SWITZERLAND	11 628	-
THAILAND	3 000	3 000
TURKEY	4 444	4 444
UNITED ARAB REPUBLIC	11 261	11 261
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	144 000	-
UNITED STATES OF AMERICA	500 000	-
VENEZUELA	9 200	-
VIET-NAM	2 000	-
YUGOSLAVIA	6 400	-
	1 068 201	108 605
UNITED STATES OF AMERICA (Matching contribution)	68 201	-
TOTAL	1 136 402	108 605

a/ Pledges and payments are expressed in United States dollars for ease of comparison, any necessary conversions having been made at Technical Assistance Board rates.

b/ Minimum pledge.

c/ Amount to be announced later.

ANNEX II

TECHNICAL ASSISTANCE OFFERED OR PROVIDED BY MEMBER STATES IN 1961 FREE OR PARTIALLY FREE OF CHARGE

Member State	Number of fellowships		Number of experts provided	Equipment in United States dollars	
	offered	awarded		offered	donated and accepted
Argentina	5	5			
Australia	-	-	1		
Belgium	6	7			
Brazil	29	9			
China	4	2			
Czechoslovak Socialist Republic	17	7		30 000	
Denmark	5	5			
Finland	2	2			
France	12	12	4		
Germany, Federal Republic of	9	11			
Hungary	4	2			
India	5	6			
Italy	10	9			
Japan	5	5			a/
Netherlands	3	3			
Poland	5	5			
Romania	2	-			
Spain	5	5			
Union of Soviet Socialist Republics	39	9			
United Arab Republic	6	6 b/			
United Kingdom of Great Britain and Northern Ireland c/	-	-	2		
United States of America	50	50	8		80 000
TOTAL	223	160	15	30 000	80 000

a/ Special donation of equipment to the Agency's new Laboratory, provided by the Japan Atomic Industrial Forum, Inc.

b/ Used at training courses in the United Arab Republic.

c/ Special offers have been made to provide Agency fellows with advanced research facilities (Radiation Laboratory, Wantage) or with advanced training and operational experience at commercial nuclear power stations.

ANNEX III

1961 FELLOWSHIP PROGRAMME

Nominating Country \ Host Country [a]	Nominations received	Argentina	Australia	Austria	Belgium	Brazil	Canada	China	Czechoslovak Socialist Republic	Denmark	Finland	France	Germany, Federal Republic of	Hungary	India	Italy	Japan	Netherlands	Norway	Poland	Spain	Sweden	Switzerland	Union of Soviet Socialist Republics	United Kingdom	United States of America	Yugoslavia	CERN	IAEA	TOTAL AWARDS
Afghanistan	2				1																				1					2
Argentina	10						1					1				1					4					2				9
Austria	11						1						4	1											1	1				8
Brazil	7											2														2				4
Bulgaria	15											6	5											1	1					13
Burma	4														2										1					3
Chile	5	2										1													1	1				5
China	14		2				1										4													7
Colombia	14					1																				4				5
Czechoslovak Socialist Republic	15				3							1	2		1	1		1				1			3	1				14
Denmark	2																									1				1
El Salvador	12					5																			1					6
Finland	1																												1	1
France	1																													0
Germany, Federal Republic of	2											1																		1
Greece	18										1	3				1		1	1						3	3			1	14
Hungary	42				1					1	1	3	4			2			1			2		1	3	2				21
India	18								1									1		1					3	3	1			10
Indonesia	29								2	1			2		1				1	2				6	2	3				20
Iran	5											1								1					1					3
Iraq	21																					1		3	4	2				10
Israel	10									1												1				4				6
Italy	22			1									1									1			2		1			6
Japan	37		1									2	1						1						2	4				11
Korea, Republic of	45							2		1						1	6					1			2	5				18
Lebanon	1											1																		1
Mexico	12	1				1						1									1				1	5				10
Netherlands	1																									1				1
New Zealand	5						1																		2					3
Norway	1																													0
Pakistan	14		1						1							1							1		3	1				8
Paraguay	3																								1					1
Peru	2	1				1																								2
Philippines	29	1	1			1	2																		2	9				16
Poland	42			1								4	1			2		2				1		1	4	4		1		23
Romania	10				1							2				1		1							2	1				8
South Africa	19				1													1							1	1				4
Spain	6																								1					1
Sudan	1																													0
Switzerland	2																									1				1
Thailand	21									1							1								6	2				10
Tunisia	1																													0
Turkey	40								1			2	2												4	3				12
United Arab Republic	12								2					1	2					1					2				1	9
United States of America	1																													0
Uruguay	1																									1				1
Venezuela	9											2	1													3				6
Viet-Nam	3				2																									2
Yugoslavia	50								1			8	4			1						3		2	5	3				27
TOTAL	648	5	5	2	9	9	6	2	8	5	2	41	27	2	6	11	11	7	6	5	5	11	1	14	65	73	2	1	3	344

[a] *In some cases the placements are awaiting confirmation.*

ANNEX IV

CONFERENCES, SEMINARS AND SYMPOSIA

A. Held in 1961

Date	Title	Place	Co-sponsoring organizations
Conferences			
15-20 May	Conference on Nuclear Electronics	Belgrade	
4-9 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	UNESCO IANEC
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	
16-21 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).

B. Programme for 1962

Date	Title	Place	Co-sponsoring organizations
Conferences			
4-9 June	Conference on the Corrosion of Reactor Materials	Salzburg, Austria	
Seminars			
16 July-25 August	Seminar on Theoretical Physics	Trieste, Italy	
5-9 November	Seminar on the Practical Applications of Short-lived Radioisotopes Produced in Small Research Reactors	Vienna	
Symposia			
26 February-2 March	Symposium on the Use of Radioisotopes in Soil-Plant Nutrition Studies	Bombay, India	FAO
7-11 May	Symposium on Radiation Damage in Solids and Reactor Materials	Venice, Italy	
14-18 May	Symposium on Reactor Safety and Hazards Evaluation Techniques	Vienna	
21-25 May	Symposium on the Thermodynamics of Nuclear Materials	Vienna	
2-6 July	Symposium on Biological Effects of Ionizing Radiation at the Molecular Level	Brno, Czechoslovak Socialist Republic	
10-14 September	Symposium on Inelastic Scattering of Neutrons in Solids and Liquids	Chalk River, Canada	
8-13 October	Symposium on the Treatment and Storage of High-level Radioactive Wastes	Vienna	
19-23 November	Symposium on Radioactive Dating	Greece	
December	Symposium on Neutron Detection, Dosimetry and Standardisation	London or Vienna	

ANNEX V

AGENCY PUBLICATIONS

(1 April 1961 - 31 March 1962)

1. Proceedings of Conferences, Symposia, Seminars and Panels

Chemical Effects of Nuclear Transformations, two volumes
Effects of Ionizing Radiation on the Nervous System
Effects of Ionizing Radiations on Seeds
Fuel Element Fabrication, with Special Emphasis on Cladding Materials, two volumes[a/]
Inelastic Scattering of Neutrons in Solids and Liquids
Nuclear Ship Propulsion
Pile Neutron Research in Physics
Power Reactor Experiments, two volumes
Radioisotopes and Radiation in Entomology
Radioisotopes in the Physical Sciences and Industry, first two volumes
Radioisotopes in Tropical Medicine
Selected Topics in Radiation Dosimetry
Small and Medium Power Reactors, two volumes
Therapeutic Dose Distributions with High-energy Radiation
Tritium in the Physical and Biological Sciences, first volume

2. Directories

Directory of Radioisotopes, revised edition

3. Series and Periodicals

(a) Bibliographical Series

No. 3	Nuclear Propulsion

(b) Review Series

No. 9	Comments on Some Aspects of Nuclear Power Economics
No. 10	Radiation in Agricultural Research and Practice
No. 11	Powder Metallurgy in Nuclear Reactor Construction
No. 12	The Packaging, Transport and Related Handling of Radioactive Materials
No. 13	Radiation-initiated Polymerization and Graft Polymerization
No. 14	Préparation et étalonnage des sources radioactives de référence
No. 15	Radioactive Isotopes and their Production under Neutron Irradiation

a/ Published by the Academic Press.

No. 16	Operating Experience with Nuclear Power Stations
No. 17	Controlled Thermonuclear Fusion Research
No. 18	Processing of Radioactive Wastes
No. 19	Concept of the Semi-Homogeneous Reactor (SHR) and Present Status of Research in Japan
No. 20	Welding Problems in Nuclear Reactors
No. 21	Heavy Water Production

(c) Safety Series

No. 4	Safe Operation of Critical Assemblies and Research Reactors
No. 5	Radioactive Waste Disposal into the Sea
No. 6	Regulations for the Safe Transport of Radioactive Materials
No. 7	Regulations for the Safe Transport of Radioactive Materials: Notes on Certain Aspects of the Regulations

(d) Technical Reports Series

No. 3	Prospects of Nuclear Power in the Philippines
No. 4	IAEA Research Contracts, First Annual Report
No. 5	Introduction to the Methods of Estimating Nuclear Power Generating Costs
No. 6	The Vinca Dosimetry Experiment

4. Journals

Nuclear Fusion: Journal of Plasma Physics and Thermonuclear Fusion, Volume I, Nos. 2 and 3

5. Miscellaneous

Bibliography on Research on Controlled Thermonuclear Fusion
Conferences, Meetings, Training Courses in Atomic Energy, Nos. 12 - 16
International Atomic Energy Agency Bulletin: Volume III, Nos. 2 - 4;
Volume IV, No. 1
Lists of Periodicals in the Field of Nuclear Energy, Nos. 1 and 2
List of References on Nuclear Energy, Volume III, Nos. 7 - 24;
Volume IV, Nos. 1 - 2

Reports of Preliminary Assistance Missions to El Salvador, Ghana, Guatemala, Mexico, Paraguay and Peru
Reports of an IAEA Mission to Dahomey, Liberia and Nigeria
Services and Technical Assistance available from the IAEA
World List of Institutions concerned with Nuclear Energy: Belgium, Canada, Ghana, India, Japan, Monaco and Venezuela

ANNEX VI

RESEARCH CONTRACTS

A. Research contracts awarded and renewed during 1961 to institutions in the countries indicated

Country	New contracts	Renewed contracts
ARGENTINA	1	1
AUSTRALIA	-	1
AUSTRIA	1	4
BELGIUM	2	2
CHILE	-	1
CHINA	1	-
CZECHOSLOVAK SOCIALIST REPUBLIC	1	1
FINLAND	2	-
FRANCE	-	4
GERMANY, FEDERAL REPUBLIC OF	1	-
GREECE	-	1
HUNGARY	1	1
INDIA	1	1
ISRAEL	2	2
ITALY	1	2
JAPAN	1	5
KENYA	1	-
NETHERLANDS	3	2
PHILIPPINES	-	1
POLAND	1	2
PORTUGAL	1	1
SOUTH AFRICA	-	1
SPAIN	1	1
SWEDEN	1	-
SWITZERLAND	-	2
THAILAND	-	1
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND	-	5
UNITED STATES OF AMERICA	-	2
YUGOSLAVIA	3	3
TOTAL	26	47

B. Research contracts awarded and renewed during 1961, arranged by subject matter

Subject matter of research	New contracts	Renewed contracts
Safe disposal of radioactive waste	3	8
Health physics and radiation protection	12	15
Radiobiology	-	14
Safeguards methods	2	1
Power reactor studies	4	1
Application of radioisotopes in:		
(a) Agriculture	1	4
(b) Hydrology	1	-
(c) Medicine	3	4
TOTAL	26	47