THE ANNUAL REPORT FOR 1975

GC(XX)/565

Printed by the
International Atomic Energy Agency
in Austria - July 1976

INTERNATIONAL ATOMIC ENERGY AGENCY

CONTENTS

List of abbreviations

Agency	International Atomic Energy Agency
AGRIS	Agricultural Information System
EURATOM	European Atomic Energy Community
FAO	Food and Agriculture Organization of the United Nations
IAEA	International Atomic Energy Agency
IBRD	International Bank for Reconstruction and Development
IIASA	International Institute for Applied Systems Analysis
INIS	International Nuclear Information System
MW	Megawatts (electric)
NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
NPT	Treaty on the Non-Proliferation of Nuclear Weapons (reproduced in document INFCIRC/140)
PNE	Nuclear explosions for peaceful purposes
SIDA	Swedish International Development Authority
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
WMO	World Meteorological Organization

NOTE

All sums of money are expressed in United States dollars.

INTRODUCTION

General

1. For the first time the Annual Report of the Board of Governors covers the calendar year instead of the period from 1 July of one year to 30 June of the next. The new procedure will make it easier to compare the work done during the year with the programme and budget for that year. A special report on budgetary performance [1] is given at the end of the report.

2. The present report covers the period from 1 January to 31 December 1975. The first six months of that period were dealt with in the previous report [2] and are treated succinctly in the present report.

3. The principal objectives of the Agency's work in 1975 as in recent years were to help Member States with their nuclear power programmes and to provide technical assistance in this connection, to help ensure the safe use of nuclear power and minimize its environmental impact and to apply safeguards against diversion. The Agency continued to foster the exchange of information and took the first steps for producing a comprehensive international journal of nuclear science abstracts. It also continued to help developing countries to apply nuclear science techniques to study and help solve problems of food, health and water resources development.

4. With regard to safeguards, an important step was taken by the five non-nuclear-weapon States of EURATOM (Belgium, the Federal Republic of Germany, Italy, Luxembourg and the Netherlands) in ratifying NPT on 2 May 1975. During the year the Board gave increasing attention to questions connected with the application of safeguards in States outside the scope of NPT.

Assistance to Member States introducing nuclear technologies

5. The target for voluntary contributions to the Agency's own technical assistance programme rose from $3 million in 1974 to 4.5 million in 1975 and the General Conference agreed to a further increase to 5.5 million in 1976. The total value of resources available for technical assistance rose from $7 915 000 in 1974 to $9 813 000 in 1975 and there was a corresponding increase in the number of large-scale projects the Agency is executing for UNDP and in other developing-country-oriented activities. The first in a series of major training courses designed to help developing countries to introduce and operate nuclear power plants efficiently and safely was held in Karlsruhe, Federal Republic of Germany.

6. The Agency launched a detailed study of the concept of Regional Nuclear Fuel Cycle Centres and took further steps to extend its work relating to the physical protection of nuclear materials against theft, forceful seizure and sabotage. In September 1975 the General Conference adopted a resolution endorsing a more active programme in this regard. [3]

7. The development of nuclear power and the regulatory implications of this development continue to shape and influence much of the Agency's work. It is reasonably clear that for the remainder of the twentieth century the main sources of energy will be oil for most forms of transport, and coal and nuclear energy (from fission) for electricity generation. Nuclear energy has maintained its cost advantage over coal and both are proving to be far cheaper than oil as a means of generating electricity. Nevertheless, new orders for nuclear plants

---

[1] Formerly included in the Agency's accounts for the year in question.

[2] Document GC(XIX)/544.

[3] Resolution GC(XIX)/RES/328.

declined from 75 000 MW capacity in 1974 to 25000 MW in 1975. The chief reason for this was the economic recession in certain major industrial countries, but environmentalist opposition to nuclear power has contributed to delays and difficulties in the construction of nuclear power plants.

8. The work of preparing a comprehensive set of safety codes and guides covering all aspects of building and operating nuclear power plants is now in its second year. Good progress was made in the preparation of five codes and eight guides or codes during the year on subjects ranging from the organization of governmental bodies dealing with nuclear regulatory matters to means of assuring the quality of materials used in, and the construction and operation of, reactors.

9. A feature of 1975 was the large orders by certain developing countries of nuclear power plant and other nuclear fuel cycle facilities. In due course this may lead to increased demands on the Agency's services for training of personnel, for advice on safety and siting, for the application of safeguards and for advice on measures of physical protection. It may be hoped that the Governments concerned will give due consideration to the possibility of using new fuel cycle facilities as the nuclei of regionally operated centres.

10. The latest survey of uranium resources production and demand prepared by the Agency and NEA at the end of 1975, showed that discoveries in the last two years have increased total reserves by about 200 000 tonnes to the figure of 1 080 000 tonnes. The report points out that while there is a great expansion of prospecting and development resulting in major new discoveries there will nevertheless be formidable problems in ensuring that there is enough uranium to meet demands over the next 25 years. The report estimates that by the year 2000 there will be a requirement for four million tonnes of uranium, and by the year 2025 this may more than double to ten million tonnes. It will be necessary to invest about $20 thousand million in exploration during the next 25 years, and a similar sum in mining and milling.

Safeguards and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

11. By the end of 1975, the Agency was applying safeguards in 64 States of which 44 were parties to NPT. The situation in relation to NPT on 31 December was as follows:

Non-nuclear-weapon States party to NPT	95
Non-nuclear-weapon States signatories of, but not at that date party to, NPT	14
Non-nuclear-weapon States that had concluded the safeguards agreements required in connection with NPT	56
Safeguards agreements in force in connection with NPT	45

12. The Safeguards Analytical Laboratory began operation on a limited scale at the end of the year. The first meeting of the standing advisory group on safeguards implementation was held in December.

Conference on Nuclear Power and its Fuel Cycle

13. The Conference on Nuclear Power and its Fuel Cycle which will take place in the framework of events to commemorate the Agency's 20th anniversary, will be held from 2 to 13 May 1977 in Salzburg, Austria. The programme of the conference has been sent to Member States and to all interested organizations, and arrangements have been made for preparing and selecting papers.

The use of nuclear explosions for peaceful purposes

14. The Ad Hoc Advisory Group on Nuclear Explosions for Peaceful Purposes, established by the Board in June 1975, held its first meeting in September. It is open to all interested States and 39 were represented at that meeting. The Group adopted a plan for its work which is to be completed, if possible, by the end of 1976. Arrangements have been made for groups of consultants to study special aspects of PNEs, namely safety, comparative economics, legal questions and procedures for PNE-related services. In the light of General Assembly Resolution 3478 (XXX) developments in the work of the Ad Hoc Advisory Group during the first half of 1976 are being summarized in the ANNEX to the present report.

The use of nuclear science techniques to help solve problems of food, health and water resources

15. For a large number of developing Member States the only practical applications of atomic energy that are at present in reach are the use of nuclear science techniques and technology in food and agriculture, in medicine and other life sciences, in water resource problems, in prospecting for minerals and, to some extent, in industry.

16. The use of nuclear science techniques is steadily growing as agricultural research expands in the developing countries and as modern methods of medicine, more sophisticated industrial enterprises and methods of prospecting are introduced. Some of the results achieved by applying these techniques are described in the sections of the report dealing with food and agriculture and physical sciences as well as in that on technical assistance.

Co-operation questions

17. No significant problems of co-ordination arose during 1975. Co-operation between the Agency and UNEP was intensified, particularly in preparing a report to the Fourth Session of the Governing Council of UNEP in early April 1976 reviewing the impact on the environment of production and use of energy. UNEP is supporting an increasing number of Agency programmes ranging from the Agency's work on pollution of the Mediterranean (at the Monaco laboratory) to its study of regional fuel cycle centres. IBRD is also providing financial support for the latter study.

18. New arrangements have been made between the Agency and WHO with a view to limiting the Agency's work in medicine, radiation, biology and dosimetry, to purely technical and non-routine problems involving the use of nuclear techniques.

THE AGENCY'S ACTIVITIES

TECHNICAL ASSISTANCE AND TRAINING

General

19. In 1975 approximately 9.8 million dollars were available for technical assistance and training [4] compared with about 7.9 million dollars in 1974, as indicated in Table 1 below:

Table 1

Estimated resources available for Agency technical assistance programmes: 1974-1975
(in dollars)

	1974	1975
Agency monetary	3 340 000	4 540 000
Assistance in kind	1 480 000	1 330 000
UNDP monetary	3 080 000	3 940 000
TOTAL	7 900 000	9 810 000

The Agency's regular programme of technical assistance

20. As shown in Table 2 below, the value of approved requests for experts and equipment under the Agency's regular programme was $3 085 500 in 1975.

Table 2

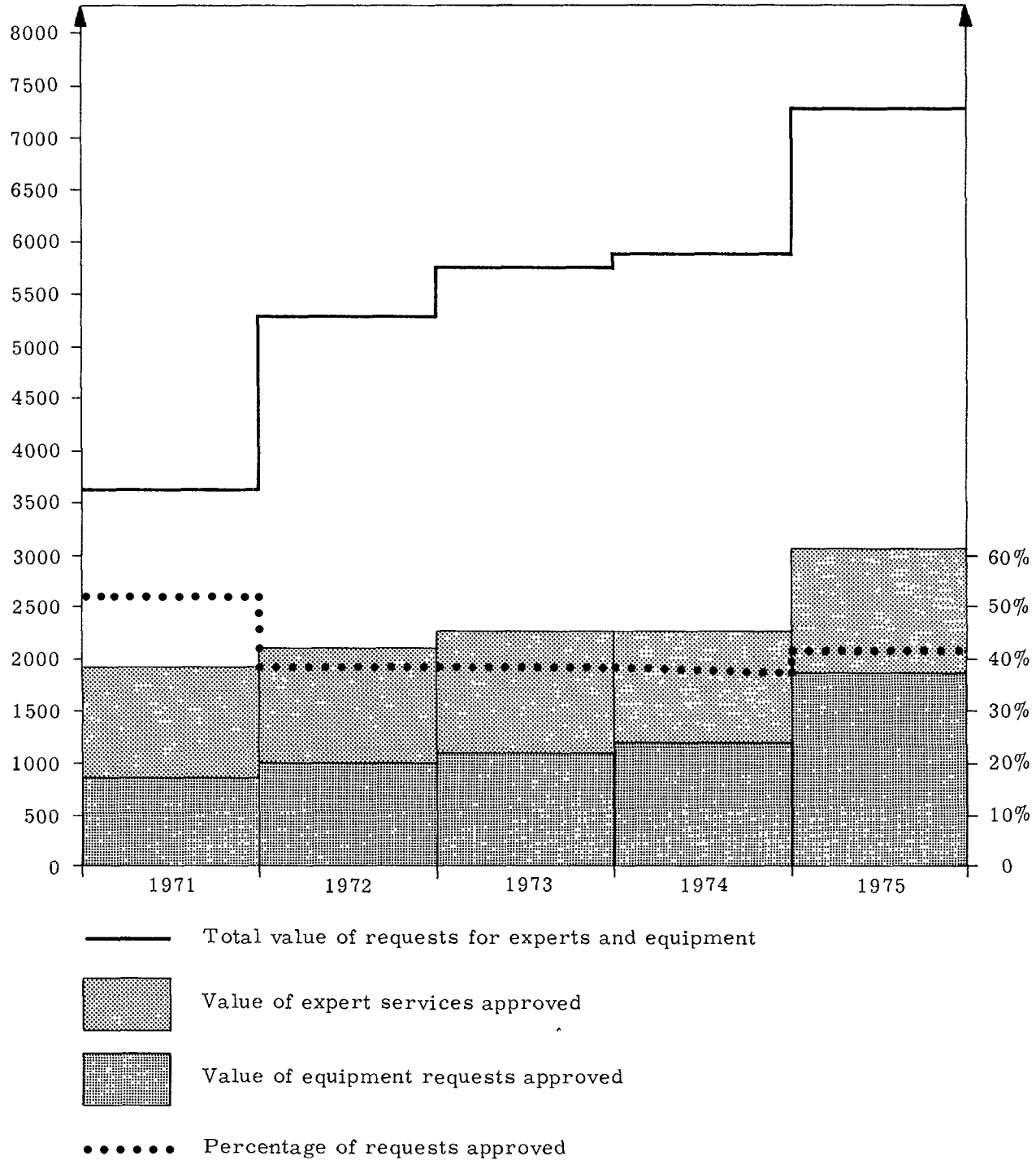
Experts and equipment: 1971-1975

Year	Value of requests received (in thousands of dollars)	Value of assistance approved (in thousands of dollars)	Percentage of requests approved
1971	3600	1891.0	52.5
1972	5268	2123.6	40.3
1973	5657	2279.0	40.3
1974	5849	2262.7	38.7
1975	7264	3085.5	42.5

[4] The precise amounts are indicated in the Director General's report on the provision of technical assistance by the Agency with special reference to 1975, in document GC(XX)/INF/161.

21. The development of the regular programme in recent years is also reflected in Figure 1 below.

FIGURE 1
EXPERTS AND EQUIPMENT REQUESTED AND APPROVED: 1971-1975
(in thousands of dollars)



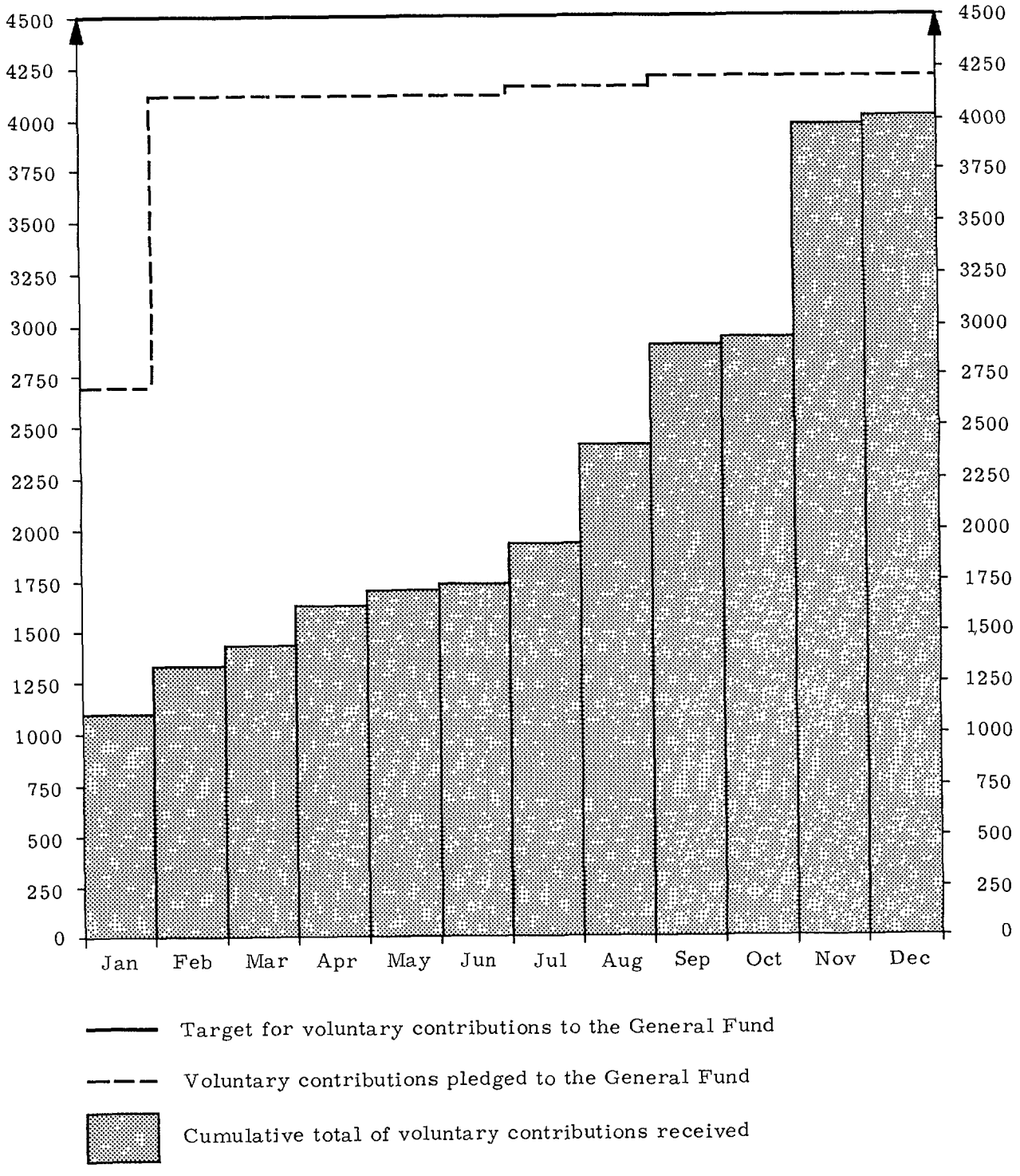
22. The status of voluntary contributions to the General Fund for the years 1967-1975 is shown in Table 3 below. In addition, the development in the receipt of voluntary contributions for the financing of the 1975 regular programme is shown in Figure 2 below.

Table 3

Voluntary contributions to the General Fund

Year	Established target (in millions of dollars)	Cash contributions pledged to the General Fund				
		Amount $	Percentage of target	Shortfall or (overrun) $	Number of members pledging	Percentage of members pledging
1967	2.0	1 431 823	71.6	568 177	62 of 98	63.3
1968	2.0	1 423 557	71.2	576 443	63 of 99	63.6
1969	2.0	1 488 426	74.4	511 574	68 of 102	66.7
1970	2.0	1 672 933	83.6	327 067	74 of 103	70.9
1971	2.5	2 142 675	85.7	357 325	71 of 102	69.6
1972	3.0	2 485 405	82.8	514 595	71 of 102	69.6
1973	3.0	2 847 012	94.9	152 988	70 of 104	67.3
1974	3.0	3 083 261	102.8	(83 261)	65 of 105	61.9
1975	4.5	4 219 641	93.8	280 359	75 of 106	70.8

FIGURE 2
RECEIPT OF VOLUNTARY CONTRIBUTIONS TO THE GENERAL FUND
FOR THE 1975 REGULAR PROGRAMME
(in thousands of dollars)



Training

23. A list of the fellowships made available to the Agency free of charge in 1975 is given in Table 4 below; some of the Type II openings were carried over from a previous year's offer. In addition, costly and valuable assistance was donated by a number of Member States (mainly by France, the Federal Republic of Germany and the United States of America) and international organizations in respect of the 15-week interregional training course on nuclear power project planning and implementation held in 1975, and in respect of the preparatory work for the series of similar training courses to be conducted in 1976.

Table 4

Fellowships offered or provided free of charge

Donor State	Number of fellowships			
	Available		Awarded	
	(1)	(2)	(3)	(4)
Argentina	5	-	1	1
Austria	-	21	1	12
Belgium	-	36	3	29
Brazil	10	-	4	42
Bulgaria	2	-	-	
Czechoslovakia	9	-	4	30
Denmark	-	60	4	33
Finland	2	-	-	
France	-	140	15	147
Germany, Federal Republic of	30	150	19	197
Hungary	4	-	2	15
India	10	-	1	12
Israel	-	45	4	38
Italy	-	250	26	259
Japan	10	-	5	36
Mexico	2	-	-	
Netherlands	8	-	8	57
Pakistan	6	-	-	
Philippines	2	-	-	
Poland	10	-	2	12
Romania	10	-	1	3
Spain	5	-	1	6
Sweden	a/	-	9	88
Thailand	2	-	-	
Union of Soviet Socialist Republics	a/	-	4	30
United States of America	a/	-	68	686
Yugoslavia	-	22	1	12

(1) Number of awards offered.
(2) Number of man-months offered.
(3) Number of awards less rejections and withdrawals.
(4) Total number of man-months awarded.

a/ Awards made on the basis of available funds.

24. Table 5 below gives an analysis of the 17 inter-country projects which the Agency conducted in 23 countries in 1975.

Table 5

Regional and interregional short-term training projects

Project	Place and dates	Total number of participants	Source of funds
Interregional training course on methods and technical bases of nuclear energy regulation	Bethesda, Maryland 28 April to 16 May	32	Regular programme and Government of the United States
Interregional seminar on the preparation and implementation of nuclear power projects	Kingston, Jamaica 9 to 20 June	37	UNDP
Interregional training course on radioimmunoassay techniques	Poznan, Poland 15 to 28 June	21	Regular programme
Interregional training course on occupational and environmental safety in the utilization of radioactive material	Boston, Massachusetts 7 July to 1 August	23	Regular programme and Government of the United States
Regional workshop on laboratory technicians' training	Seoul, Republic of Korea 27 to 31 October	17	Regular programme
Interregional training course on the use and maintenance of nuclear and related electronic equipment	Turin, Italy 1 September to 28 November	16	UNDP
Interregional training course on nuclear power project planning and implementation	Karlsruhe, Federal Republic of Germany 8 September to 19 December	35	Regular programme and Government of the Federal Republic of Germany
Interregional training course on uranium geochemical prospecting methods	Austria 8 September to 18 October	22	UNDP
Interregional seminar on radiation protection and waste handling in industry, chemistry, medicine and research	Berlin (West) 27 October to 7 November	13	Regular programme

Project	Place and dates	Total number of participants	Source of funds
Interregional training course on the use of nuclear techniques in animal production	Khartoum, Sudan 3 to 28 November	18	SIDA
Study tour on the use of nuclear and other techniques in animal production studies	Australia 10 November to 5 December	14	UNDP
Study tour on the development of nuclear power	Bulgaria, Czechoslovakia, German Democratic Republic and the Soviet Union 10 November to 9 December	22	Regular programme
Regional training course on the use of nuclear techniques for the study of chemical residue and pollution problems	Middle Eastern Regional Radioisotope Centre for the Arab Countries, Cairo 3 to 28 November	20	UNDP
Interregional training course on food irradiation	Rio de Janeiro, Brazil 3 November to 12 December	31	Regular programme and Government of Brazil
Regional project on radiological health and safety measures, including a regional seminar held at	East and West Africa January to December	109	UNDP
	Lusaka, Zambia 27 October to 7 November	9	
Co-operative project in neutron scattering	Asia and the Pacific 1975	10	Regular programme

UNDP projects

25. In 1975 the Agency was carrying out 19 large-scale UNDP projects in 16 countries which are listed in Table 6 below. For a summary of the scope and objectives of each project see the last annual report [5]; any new developments are given below.

[5] Document GC(XIX)/544, paras 33-52.

Table 6

UNDP large-scale projects for which the Agency is the executing agent

Recipient country and title of the project	Start of field operations	Project duration (years)	Government contribution (in local currency)	UNDP contribution (in dollars)
ARGENTINA, National centre for non-destructive testing and quality control[a/]	March 1973	5.0	11 157 300 new pesos	594 600
BRAZIL, Application of nuclear technology in agriculture	September 1972	5.0	12 433 310 cruzeiros	1 266 000
CHILE, Technological applications of nuclear energy	January 1974	4.5	46 900 000 escudos	790 000
CHILE, Uranium prospecting	September 1975	3.0	1 016 200 000 escudos	939 400
EGYPT, Radiation dosimetry after accidents	November 1971	5.0	80 000 Egyptian pounds	171 400
EGYPT, National Centre for Radiation Technology	February 1975	3.0	1 701 208 Egyptian pounds	750 900
GREECE, Exploration for uranium in Central and Eastern Macedonia and Thrace[b/]	May 1971	5.5	31 256 000 drachmae	619 200
HUNGARY, Irradiation sterilization of medical products	June 1974	4.5	91 052 000 forints	615 700
INDIA, Demonstration plant for the irradiation sterilization of medical products	May 1972	4.0	4 552 500 rupees	662 400
INDONESIA, Mutation breeding	May 1972	5.0	4 000 000 new rupiahs	149 999
REPUBLIC OF KOREA, Radiation processing demonstration facility	April 1974	3.0	340 360 000 won	496 500
MOROCCO, Use of radioisotopes in agriculture	September 1973	3.0	930 000 dirham	188 200

Recipient country and title of the project	Start of field operations	Project duration (years)	Government contribution (in local currency)	UNDP contribution (in dollars)
MOROCCO, Training and research in applied nuclear physics at the Faculty of Sciences, Rabat	August 1974	3.5	1 022 750 dirham	467 300
NIGERIA, Insecticidal investigations for tsetse fly eradication	June 1974	3.0	89 800 naira	141 200
PAKISTAN, Exploration for uranium in the Siwalik Sandstones, Dera Ghazi Khan District b/	September 1971	5.0	12 869 100 rupees	1 354 000
ROMANIA, Development of nuclear technology	February 1973	3.0	119 985 500 lei	1 366 500
TURKEY, Exploration for uranium in South-West Anatolia	January 1974	3.0	9 613 000 liras	647 300
YUGOSLAVIA, Radiation unit for the industrial application of ionizing radiation	June 1975	3.5	6 830 000 dinars	411 400
ZAMBIA, Radioisotope applications	October 1970	5.0	147 624 kwacha	151 500

a/ Implemented in association with UNIDO.

b/ Implemented in association with the United Nations.

National centre for non-destructive testing and quality control in Argentina

26. Little assistance was provided to this project in 1975 because of organizational changes and delays in the recruitment of staff made available by the Agency. The project has been reviewed entirely and is expected to regain momentum in 1976.

Application of nuclear technology in agriculture in Brazil

27. The discovery of a bean mutant resistant to Golden Mosaic, a disease considered a scourge throughout Latin America and which has become crucial only recently in Brazil, has created great interest; intensive testing of this mutant is now underway.

28. In entomology, a survey programme of the sugar cane borer, Diatraea saccharalis, is producing information of importance for control measures.

29. Studies in soil microbiology continue with work on nitrogen fixation in beans and on non-symbiotic nitrogen-fixation in sugar cane. The work in biochemistry emphasizes studies on bean protein content and quality, while in plant pathology work has been carried out on the identification of plant-infecting viruses.

30. Recognition of the progress being made at the Centre of Nuclear Energy in Agriculture (CENA), now part of the local School of Agriculture in Piracicaba, is reflected in a proposal to convert CENA into a specialized institute of the University of the State of São Paulo. It is likely that additional UNDP large-scale assistance to the project will be approved.

Technological applications of nuclear energy in Chile

31. Minor revisions were made in the project's objectives and work plan, resulting in a regrouping of activities to the end of 1976. Experts recruited by the Agency carried out a training programme on various applications of nuclear energy.

Uranium prospecting in Chile

32. Seven areas covering 24 200 m^2 have been designated for the reconnaissance survey. Chilean personnel received preliminary training in aerial and terrestrial radiometric survey methods and in geochemical prospecting techniques. During the second half of 1975, a number of Agency-recruited experts and the project manager took up their duties.

Radiation dosimetry after accidents in Egypt

33. There was some delay in the recruitment of experts but this will be remedied during the first half of 1976.

National Centre for Radiation Technology in Egypt

34. The training abroad of counterpart staff began in 1975 and the project manager has been recruited to take up his duties in January 1976.

Exploration for uranium in Central and Eastern Macedonia and Thrace, Greece – Phase II

35. Test drilling has already begun and the training of counterpart staff continues.

Irradiation sterilization of medical products in Hungary

36. The building which will contain the irradiation facility was completed at the end of 1975. Training of counterpart staff is continuing and the commissioning of the plant is expected early in 1977.

Demonstration plant for the irradiation sterilization of medical products in India

37. The irradiation sterilization plant is now used at about 35% of its installed capacity. UNDP assistance to the project was completed in 1975. A gradual increase in capacity utilization is foreseen.

Mutation breeding in Indonesia

38. As a first priority lowland and upland rice varieties were selected, to try to improve their production/hectare, protein value, disease resistance, response to fertilizers, and shorten the time for crop maturity. As a next step, wheat improvement is sought in terms of higher yield potential, shorter stalks, and adaptation to low altitudes. Grain legumes

(for example, soybeans and groundnuts) also offer distinct possibilities for improvement, as does sugar cane, with regard to yield, drought and disease resistance. The production of early maturing mutants and also improvements in the protein content in some varieties are obviously significant supplements to the results obtained from conventional breeding programmes in rice in Indonesia.

39. The release of a new rice variety developed by the counterpart organization is expected as soon as the required official testing by the Ministry of Agriculture has been completed. Work on other crops (for example, wheat, soybeans, groundnuts, sugar cane and rubber) is also going well and will be intensified in 1976.

Radiation processing demonstration facility in the Republic of Korea

40. The cobalt-60 irradiator and the 300 keV electron accelerator have been installed and the radiosterilization of medical products began in November 1975.

Use of radioisotopes in agriculture in Morocco

41. The Agency's contribution consists mainly of providing advice on research programmes such as fertilizer utilization studies, as well as providing in-service training and opportunity for study abroad.

Training and research in applied nuclear physics at the Faculty of Sciences, Rabat, Morocco

42. A full-time adviser to the Faculty of Sciences and a number of consultants were assigned to the project, and fellowship training abroad was begun.

Insecticidal investigations for tsetse fly eradication in Nigeria

43. The Agency's expert joined the project in 1975 and satisfactory progress has been made.

Exploration for uranium in the Siwalik Sandstones, Dera Ghazi Khan District, Pakistan — Phase II

44. Reconnaissance of the project area has been completed and emphasis is being placed now on the search for, and evaluation of, uranium ore bodies and the training of staff.

Development of nuclear technology in Romania

45. Construction of the buildings for the new institute at Pitesti-Colibasi is progressing and the first units were moved into the new premises at the end of 1975.

Exploration for uranium in South-West Anatolia, Turkey

46. Test drilling and geochemical surveying are well under way.

Radiation unit for the industrial application of ionizing radiation in Yugoslavia

47. A subcontract for equipping the irradiation plant has been awarded and plans for the construction of the plant have been finalized.

Radioisotope applications in Zambia

48. Assistance to the project was completed in 1975 and the Radioisotope Unit of the National Council for Scientific Research is now able to function as originally planned.

SIDA project

Development of the Institute of Nuclear Agriculture in Bangladesh (1975-1979)

49. The purpose of the project is to enable the Government to establish the new laboratory at Mymensingh to initiate applied research and provide guidance on the most effective use of available resources to meet the agricultural production targets. SIDA assistance with a value of $1.3 million over a five-year period involves the provision of 68 man-months of expert services and 300 man-months of training abroad for the counterpart staff.

FOOD AND AGRICULTURE

50. The joint FAO/IAEA programme on food and agriculture is designed to help developing Member States to apply isotopes and radiation techniques in solving important problems relating to production and protection of food and to the protection of the environment from potential damage by inappropriate use of mineral fertilizers and pesticides. Its objectives are sought by training and other forms of assistance of which co-ordination and support of research is an important part. Thus, research programmes are carried out in laboratories and other institutions in Member States with the support, in certain cases, of the Agency's Laboratory and co-ordinated by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture.

51. Significant progress has been made in a research project on the most efficient methods of applying fertilizers to soya beans, common bean and other grain legumes without losing the benefits of their capacity to fix atmospheric nitrogen. In another project, isotope techniques have proved effective in measuring the rate of movement of drainage water and other elements in the water balance of various types of soil in different climatic conditions. A project involving radio-zinc is also in progress in which experiments are being made with a view to developing means of diagnosing and remedying zinc deficiency in flooded rice paddies.

52. Good results have been obtained under the FAO/IAEA plant breeding programmes sponsored by the Federal Republic of Germany and by SIDA. A Danish laboratory has produced barley mutants having better grain protein and these are being tried in many countries to breed more nutritious varieties of barley. It has also been shown that serious losses in pearl millet caused by downy mildew in India can be avoided if hybrid varieties of millet produced with resistant mutants are sown.

53. The Agency and the Government of Nigeria have agreed in principle on a large-scale project for suppressing the tsetse fly, the vector of sleeping sickness in man and nagana in cattle. The project includes the use of the sterile insect technique (SIT) and is expected to start in 1976. It is expected that several countries will make substantial contributions to this project. SIT is one of the methods being used on a large scale by the United States to eradicate a new Mediterranean fruit fly infestation in Southern California, and the technique is also being investigated as a practical control measure for the same pest in Argentina, Italy, Peru and Spain. After the encouraging results obtained with releases of sterilized olive flies in Greece, this country is conducting ecological studies on Crete in preparation for a larger scale field release programme. Similarly ecological studies are being carried out in Yugoslavia.

54. A co-ordinated research programme has been completed in which isotopes were used to study the incorporation of cheap non-protein nitrogen (NPN) into protein of high nutritious value by cattle and other ruminants. Laboratories in Czechoslovakia, Egypt, Hungary, India, Indonesia and Yugoslavia have studied the conditions necessary to assist the rumen micro-organisms in building protein that can be utilized by the animal and subsequently by man. The findings show that NPN can be used to satisfy part of the protein requirement as long as high-energy, agro-industrial wastes such as cane molasses are also added. Studies on radiation attenuated vaccines and on the water requirements of animals in a hostile environment continued, and a new programme has begun aiming at the use of isotope techniques in improving the reproductive efficiency of farm animals.

55. The Joint Division has completed co-ordinated research programmes in which chemical and radioactive tracer techniques were used to study contaminants and pollutants in agriculture, food and fish. Studies have been made of the amounts and fate of pesticide residues in staple crops and in the soil by institutes in Brazil, Canada, the Federal Republic of Germany, Ghana, Hungary, India, Israel, Japan, Jordan, Lebanon, the Netherlands, Pakistan, the Philippines, Sweden, Switzerland, Uganda, the United Kingdom, the United States and Yugoslavia. Similar studies have been made of the accumulation of mercury and trace metals in the vegetation and fauna of rivers and lakes and coastal fisheries

(aquatic ecosystems) by institutes in Finland, Mexico and Turkey. Studies of the biological side-effects of chemical residues in food and agriculture are continuing. New programmes have begun on the effects of such residues in edible oil seeds and in rivers and lakes and other inland aquatic ecosystems. Conservation of soil nitrogen and controlling its loss (caused mainly by downward leaching below the root zone), is the subject of a major co-ordinated research programme supported by the Federal Republic of Germany. This programme aims at the control of the pollutant potential of fertilizer nitrogen residues as undesirable nitrate in food, feed or water, and to improve their conservation in soil as useful plant nutrients.

56. Institutes in seven Asian countries (Bangladesh, India, Indonesia, the Republic of Korea, Pakistan, the Philippines and Thailand) are now taking part in a regional Agency project on the technical and economic feasibility of preserving fish by radiation. There has also been progress on the use of food irradiation on a commercial and industrial scale. In 1973, an agricultural co-operative in Japan brought into operation the world's first commercial potato irradiator, having a capacity of 10 000 tonnes a month and designed to inhibit sprouting. The plant has been in successful operation for three successive seasons. Encouraging results have also been shown in the work of the International Project in the Field of Food Irradiation (Karlsruhe, Federal Republic of Germany), in which the wholesomeness of irradiated foods is being studied, and in which 23 countries are now participating. Under the project the work has been completed on wheat, wheat products and potatoes and emphasis is being shifted to the study of the wholesomeness of certain categories of food-stuffs and, latterly, of food irradiation as a process. Reports on the work of the project and of other studies on toxicology, nutritional value and microbiology of irradiated foods will be evaluated by a joint FAO/IAEA/WHO expert committee in 1976. The Karlsruhe project has been renewed for another three years until 1978 at which time it is envisaged that it will have completed the bulk of its work. The number of irradiated food items that Member States have accepted for limited or unrestricted clearance have increased from 19 to 25.

General

57. The Agency's programme on life sciences encourages the use of nuclear techniques in medicine, radiation biology and environmental studies. During the year efforts were also continued to improve the accuracy and reliability of radiation dosimetry.

Medical applications

58. The IAEA/WHO joint research programme on trace elements in cardiovascular diseases has been continued and a new joint research programme with WHO on trace elements in human milk has been started.

59. The Secretariat is making a study of the requirements of developing countries for instruments used in nuclear medicine. The completion of the co-ordinated research programme on computer-assisted scintigraphy has been delayed until 1976 by difficulties encountered in the preparation of intercomparison materials.

60. The following programmes were completed: the joint IAEA/WHO programme on iron nutrition, which had brought about major methodological improvements in techniques for assessing absorption of iron from the diet, and the co-ordinated research programme on the use of radioisotopes in certain in vitro assay methods. The Agency directed its main effort in this work to studies of microbial diseases such as cholera.

Radiation biology

61. The Agency has encouraged the use of radiation to sterilize ready-to-use hermetically sealed medical supplies and has supported and co-ordinated research on this subject in ten institutions from eight Member States.

62. Results from another co-ordinated research programme indicate that at least one parasitic disease, namely malaria, might be controlled by immunological means using nuclear techniques.

63. The Agency has begun a co-ordinated research programme with a view to improve radiation treatment of cancer by utilizing radiosensitizers and radioprotectors. Six research contracts and two agreements have been awarded to institutes in seven countries at a total cost of $23 000.

64. Ionizing radiation offers some promise as a means of treating municipal and industrial wastes. A symposium on this subject was held at Munich, Federal Republic of Germany, on the use of high-level radiation in waste treatment - status and prospects. It was found that one of the promising uses is the radiation sterilization of sewage sludge by which pathogenic micro-organisms are effectively disinfected. The treated sludge can be safely re-used as fertilizer or soil conditioner. The Agency is planning a co-ordinated research programme to provide standard reference data on radiosensitivity of pathogens in wastes for Member States introducing this technology.

65. A symposium on the biological effects of low-level radiation pertinent to protection of man and his environment was held at Chicago, the United States, in co-operation with WHO, the United States Energy Research and Development Administration and the Argonne National Laboratory. Data obtained by animal experimentation on genetic and somatic effects were complemented by epidemiological surveys to assess risks of internal and external exposure to small doses of ionizing radiation in human populations. It became clear that further efforts and the use of more sophisticated methods are necessary to arrive at a better qualitative and quantitative assessment of risks, so as to serve as a

foundation for radiation protection standards. The Agency is concentrating on environmental radiation biology because of public concern over biological hazards from radiation. It has therefore started a co-ordinated research programme on radiation-induced chromosome aberrations for genetic risk evaluation in man.

66. In early 1975 the Agency launched a project on neutron activation analysis of pollutants in human hair. This is expected to indicate the extent that environmental pollution of certain kinds affects man himself. Research contract funds awarded for the radiation biology sub-programme amounted to $107 000 in 1975.

Dosimetry

67. In accordance with an agreement reached with WHO the latter will henceforth have the principal administrative and organizational responsibility for the international network of secondary standard dosimetry laboratories, while the Agency will provide scientific and technical support, particularly in regard to the setting and observance of physical standards. The joint IAEA/WHO postal dose comparison service for Co-60 radiation used in radiation therapy was continued. The Agency provided WHO and its Regional Offices with three batches for distribution, each containing about 50 sets of dosimeters. A trial dose comparison for orthovoltage X-rays was performed with 12 institutions participating.

68. The number of californium-252 loan contracts was increased to 20, and the Agency held a seminar at Karlsruhe, Federal Republic of Germany, on the uses of californium-252 in teaching and research which resulted in a publication within the Agency's Technical Reports Series.

69. During 1975 the Agency awarded research contracts in nine Member States on radiation dosimetry at a total cost of $39 200.

PHYSICAL SCIENCES

Physics

70. The main emphasis in the Agency's programme on physical sciences is to make immediate practical use in industry, agriculture and environmental research of the methods and techniques used in fundamental nuclear research. This emphasis was endorsed by an advisory group meeting at Accra, Ghana in July 1975.

71. In regard to nuclear fusion the Agency held an advisory group meeting on experimental aspects of laser-induced fusion at Trieste in August 1975, and helped to organize a technical committee meeting on large tokamak experiments at Dubna, Soviet Union, in July 1975. The future of laser and electron-beam produced fusion was also considered at Trieste by 30 scientists from several major laboratories of the world. Problems were identified to the solution of which small laboratories could contribute and thereby help the overall programme in this field. At Dubna, Soviet Union, comparisons of four large tokamak projects from EURATOM, Japan, the Soviet Union and the United States showed that although they all have the same objective (to reach "close to thermonuclear plasma conditions") the methods used to attain them are different. The projects thus complement each other in a way which is to the advantage of future designs of prototype fusion reactors.

72. The tenth and final meeting of the Joint NEA/IAEA International Liaison Group on Thermionic Electrical Power Generation was held in September at Eindhoven, the Netherlands.

Industrial applications and chemistry

73. The Agency is continuing to promote regional co-operation in Asia and the Far East on industrial applications of isotopes and the use of nuclear techniques for mineral prospecting and trace element analysis. Institutes in nine Member States are carrying out research on these topics under co-ordinated programmes (Egypt, the Federal Republic of Germany, India, Indonesia, Japan, the Philippines, Thailand, the United Kingdom and the United States).

74. The Agency has awarded contracts to Bangladesh, Brazil, India, the Republic of Korea, Mexico, the United Kingdom and Yugoslavia to carry out research on the preparation of radiopharmaceuticals and radiation processing of industrial products.

75. An international programme was initiated to compile data on the chemical thermodynamic properties of the actinide elements and their compounds.

Isotope hydrology

76. The Agency has continued to carry out pilot studies or provide services to other United Nations bodies carrying out large-scale UNDP projects in order to demonstrate the use of isotope techniques in water resource studies and other hydrological field projects. The countries in which such studies are being carried out include Greece, Jamaica, Lebanon, Mexico, Qatar, Sudan and Togo. The numbers of isotope laboratories carrying out hydrological work is also steadily increasing. During 1975 the Agency carried out further intercomparisons of laboratory measurements of stable isotopes (oxygen-18 and deuterium) and started a new world-wide intercomparison of tritium.

77. The Agency continued to collect environmental isotopic data from the IAEA/WMO global network of precipitation stations and published the fifth volume of data covering the years 1970 and 1971. The Agency concluded agreements for further collaboration with UNESCO and WMO under the long-term "hydrological programme".

Nuclear data

78. The Agency's nuclear data activities have been extended to charged particle nuclear reaction data, neutron cross-sections for reactor dosimetry, nuclear data of transactinium isotopes and, in co-operation with the International Centre for Theoretical Physics in Trieste, to the development of nuclear theory for the computation of nuclear data. The third international review of thermal nuclear data for fission reactors has been completed.

79. Countries having small data programmes are increasingly directing their research in such a way as to meet the needs shown in the "world request list for nuclear data measurements". The Agency has accordingly started two co-ordinated nuclear data measurement programmes between research institutes in Japan and the Republic of Korea and between the Bhabha Atomic Research Centre at Trombay, India and the Atomic Energy Centre at Dacca, Bangladesh.

80. In accordance with the recommendations of the International Fusion Research Council, the Agency is including atomic and molecular data for fusion in its existing programme. It will accordingly review the requirements for such data for thermonuclear fusion research and technology and will co-ordinate the compilation, evaluation and exchange of such data.

THE LABORATORIES

Seibersdorf Laboratory

Agriculture

81. Under the co-ordinated research contracts programme carried out by the Agency and FAO, the Laboratory:

(a) Analysed 5700 plant samples for nitrogen-15 content;

(b) Developed methods to screen protein mutants in large numbers of wheat, barley and millet seeds. The Agency is now able to analyse 800 grain samples per day for protein characteristics using three different methods;

(c) Irradiated batches of seed material for mutation breeding; and

(d) Continued the studies of the mass rearing of the Mediterranean fruit fly, the olive fly and of the two species of tsetse fly, by membrane feeding.

Chemistry

82. The Laboratory carried out six international intercomparisons of radiochemical analysis of environmental and biological materials. This involved the evaluation of 2800 results. It distributed 800 reference samples to 150 institutes in 40 Member States and published, in co-operation with EURATOM an "International Directory of Certified Radioactive Materials". It also made 1200 analyses of the uranium, thorium and other content of rock samples for prospecting work in ten Member States.

Safeguards Analytical Laboratory (SAL)

83. The construction of SAL was completed in 1975, and the Laboratory began operating with a limited operating licence. It received 457 uranium safeguards samples in 1975 and analysed 327 of them, distributing the remainder to national laboratories.

International Laboratory of Marine Radioactivity

84. The main areas of research during the year were:

(a) Assessment of the behaviour of natural alpha-emitting and natural transuranic radionuclides in certain benthic organisms (organisms occurring in the depths of the ocean or the bottom underlying those depths) and plankton;

(b) Studies of the effect of marine pollutants such as mercury and selenium on marine organisms;

(c) Collection of plankton samples on a line from Turkey to Spain in order to make baseline measurements of heavy metals in marine biota in the Mediterranean;

(d) Intercalibration of trace element measurements in marine samples. 110 laboratories in 27 Member States took part in the first intercalibration using oyster tissue homogenate; and

(e) Continued work on the interaction of chlorine with sea water and dissolved organic matter.

85. The plankton sample collection referred to in sub-paragraph (c) above was done under a UNEP field programme. Other studies of non-nuclear pollution that the Laboratory carried out under the UNEP-funded programme were:

(a) A one-year baseline study of the levels of chlorinated hydrocarbon pesticides (including DDT) and polychlorinated biphenyls in mussels from the northwest coast of the Mediterranean;

(b) A survey of the concentration of polychlorinated biphenyls in sea water in the same area and in sea water and in sediments from the open Mediterranean sea;

(c) Preliminary studies of the levels and effects of chlorinated hydrocarbons on a community of plankton; and

(d) A world-wide intercalibration programme for measuring chlorinated hydrocarbons in marine samples.

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

86. The main fields of research and training-for-research at the International Centre for Theoretical Physics during 1975 were:

(a) Nuclear physics;

(b) Elementary particles and fundamental theory;

(c) Solid state physics;

(d) Applicable mathematics; and

(e) Physics of oceans and atmosphere.

87. Approximately 1000 scientists visited the Centre during 1975, though the average length of stay was shorter than in previous years. A large fraction of these scientists came from developing Member States, and some 70% of the financial resources available for scientific activities was used to support the activities of scientists from these countries. Financial support was received from the Government of Sweden through SIDA in relation to the Associate Membership Scheme as well as for extended courses, and from UNDP for activities in solid state physics, applicable mathematics, and physics of the oceans and atmosphere.

Nuclear and electric forecasts and economics

88. At the end of 1975, nuclear power plants of an aggregate capacity of 76 000 MW accounted for nearly 5% of the world's electrical capacity. In spite of a fourfold increase in the price of uranium ore and the doubling of enrichment charges, the cost of nuclear fuel used in nuclear power plants was still one third to one quarter of that of fuel oil, and the economic advantage of nuclear over other forms of power generation also continued.

89. Nevertheless, there was a substantial decline in orders for new nuclear power plants from 75 000 MW in 1974 to 28 000 MW in 1975. Owing to the economic recession in many Member States, there was little or no growth in electric power consumption. Plants ordered in the late 1960s on the basis of assumed rates of growth of 6 to 7% per year came into operation in 1974 and 1975. This left many utilities with large reserves of spare capacity at a time when capital shortages, high interest rates and sharp increases in fuel costs made financing of new installations particularly difficult. Moreover, the uncertainties regarding the "rear end" of the nuclear fuel cycle, increasingly complex regulatory requirements and expanding opposition to nuclear power had a marked effect on the nuclear power programmes in many industrialized States.

Table 7

Forecasts of installed total electric and nuclear capacity
(in thousands of MW)

	1975	1980	1985	1990	2000
Electrical	1600	2200	3000-3300	4000-4500	7000-8000
Nuclear	75	220-230	490-650	1000-1300	2000-2600
Percentage share of nuclear (%)	5	10-10.5	16-16.5	25-29	28.5-32.5

90. As the economic recession ends, it is expected that the orders for nuclear power plants will rise again. Moreover, there were several sales or supply agreements in 1975 that indicated that there would be a large growth and spread of nuclear power plants and other major nuclear installations in Asia, the Middle East and Latin America during the next decade. In these circumstances, the need for careful analysis of nuclear power projects in developing countries and for trained manpower is bound to grow. The Agency continued its relevant programmes in 1975 and broadened the major training programme for the personnel of energy authorities and power companies who will be responsible for carrying out nuclear power programmes in developing countries. The Agency has also added to its series of computer programmes other methodological tools for the economic analysis of electrical power systems, and these programmes and methodologies have been used in the Agency's nuclear power planning services and for training power company engineers. The Agency has released a number of computer codes to the countries concerned and to IBRD and the United Nations Economic and Social Commission for Asia and the Pacific.

91. The Agency has also developed computer programmes and other methods for analysing the demand for nuclear fuel cycle services, maintaining up-to-date information about the demand for natural uranium and for enrichment services as it is affected by changes in nuclear power programmes. Preparations have also begun for the International Conference on Nuclear Power and its Fuel Cycle to be held in Salzburg, Austria, from 2 to 13 May 1977.

Nuclear materials and the fuel cycle

92. At the end of 1975, the Agency and NEA jointly published the fifth major report on uranium resources, availability, production and demand. Amongst the chief changes since the fourth report, there has been an increase in the reasonably assured resources in the lower cost bracket from 866 000 to 1 080 000 tonnes and the emergence of Australia as one of the five countries having the largest uranium resources.

93. If a shortage of uranium is to be avoided in the 1990s, it will be necessary to find new reserves containing about four times as much ore as presently proven reserves. Because of this and the expected increase in uranium demand, there has been a steady rise in the number of technical assistance and large-scale UNDP-financed uranium prospecting projects. Such projects were being carried out or launched in 22 developing countries; these included five large-scale UNDP projects. The Agency held a two-month training course in Austria on geochemical survey methods in the autumn of 1975.

94. A symposium in Gabon in June 1975 studied the natural fission reaction that took place in the earth 1800 million years ago at Oklo. The discussion showed the need for further studies of natural nuclear reactors for two reasons which have a direct bearing on nuclear power development. The fact that the fission products in the Oklo reactor remained in situ for such a long period of time and the geological circumstances in which this "storage" took place, could help in planning long-term artificial storage facilities for high-level wastes in appropriate geological formations. A better understanding of the uranium ore geology at Oklo could also cast light on the process of formation of uranium ore deposits.

95. The main focus of other fuel cycle work has been on new methods of uranium ore processing, techniques for recognizing and evaluating uraniferous areas, new techniques and instruments for prospecting and exploration.

96. The co-ordinated research programme on bacterial leaching of uranium ores has continued to yield promising results.

Regional nuclear fuel cycle centre project

97. During 1975, the Agency launched a comprehensive study of the establishment of nuclear fuel cycle centres on a regional basis. Mathematical models and computer codes are being prepared for analysing the flow of materials in the fuel cycle and for evaluating alternative strategies for reprocessing, storage, transport, fuel fabrication and waste management. Work has begun on studying the institutional, legal and other related aspects of the concept with a view to examining the various types of multinational arrangements that may be made for setting up such centres. Several Member States expressed interest in the study during the General Conference and are providing assistance. The overall cost of the project is expected to be about $800 000. Part of this cost will be met by the Agency's Regular Budget while the main part will be met by contributions from organizations such as IBRD and UNEP, and from Member States.

Supply of nuclear materials

98. The nuclear material for which the Agency arranged the delivery is shown in a separate report. [6] The Board approved requests from Pakistan, the Philippines and Romania for enriched uranium fuel for research reactors. The Director General assisted six Member States to obtain quantities of enriched uranium and plutonium below the "safeguards exemption" limit. Through these and other arrangements, the Agency received 16 requests for nuclear material from ten countries and the Agency itself obtained 14 consignments of small quantities of uranium and plutonium chiefly for its safeguards programme. The United States' grant of $50 000 worth of enriched uranium was allocated to the Philippines ($38 000) and Yugoslavia ($12 000).

---

[6] See document INFCIRC/40/Rev. 11.

Power reactors

99. Although the smallest commercially available power reactor is usually considered today to be of the order of 600 MW, there are indications that smaller plants may become available, and there has also been some interest in obtaining 600 MW plants and operating them initially at a lower output until the national grid can make use of the plant's full capacity. These are matters of obvious interest to developing countries where the demand for power does not yet justify one or more 600 MW plants. The Agency is keeping the matter under review.

100. During the year, the Agency carried out or revised nuclear power planning studies for Bangladesh, Hong Kong, Indonesia and Pakistan and sent a nuclear power advisory mission to Kuwait. The Agency's 1975 annual report on operating experience included data on 133 of the 172 nuclear reactors that were in operation in 1974. The first edition of an annual list of power reactors in Member States was also published.

101. A symposium held at Innsbruck, Austria, in April 1975 provided encouraging reports about the reliability of nuclear power plants. It showed the value of "reliability techniques" in the design of systems relating to safety and in carrying out safety analyses. The symposium also showed that it was desirable to apply these techniques more widely and fully by continuous exchange of information between reliability engineers and engineers concerned with the design, operation and maintenance of nuclear power plants. Under the aegis of the Agency's international working groups dealing with nuclear power plant reliability, a meeting on Control Room Design was held at San Francisco in 1975, and another on Fracture Mechanics Applications: Implications of Detected Flaws at Winterthur, Switzerland, in December 1975.

Advanced nuclear technology

102. The International Working Group on Fast Breeder Reactors arranged meetings on the reliability and safety of liquid metal fast breeder reactors (in particular, fuel failure mechanisms); on systems for the removal of decay heat, and on fission and corrosion product behaviour in primary circuits.

103. A symposium at Jülich, Federal Republic of Germany in October 1975, reviewed recent advances in the technology of high temperature reactors used in generating electricity and/or as a multi-purpose source for industry. While an increasing substantial research and development effort is given to advanced concepts, such as for nuclear heat application, as coal gasification, coal liquefaction etc., the paramount concern continues to be demonstration of operational capability of the conventional high-temperature reactor for electric power generation. The Agency held meetings at Dubna, Soviet Union, in July 1975 on the objectives and design features of the next generation of large Tokamak devices that will come into operation in the early 1980s.

104. The Agency co-sponsored an international conference at Washington, D.C. in June 1975 covering new developments in magnetohydrodynamic (MHD) electrical power generation. The conference provided the opportunity for a wide-ranging discussion on the latest scientific and engineering progress in developing MHD generators and dealt with matters such as special pulsed MHD generators and open cycle systems. The conference also showed that there continues to be a good basis for co-operative programmes between international institutes. The NEA has informed the Agency that it is withdrawing from the joint IAEA/NEA liaison group on MHD.

Nuclear explosions for peaceful purposes (PNE)

105. Due to increased interest in PNE a unit for PNE-related services was established in the Secretariat in January 1975. [7]

---

[7] See document GC(XIX)/544, para. 113.

106. In June 1975 the Board of Governors established an Ad Hoc Advisory Group on Nuclear Explosions for Peaceful Purposes, open for participation to all interested States, to examine the aspects of PNEs with particular reference to procedural aspects relating to possible requests for PNE-related services, legal aspects and treaty obligations, health and safety matters, and economic aspects including comparisons with non-nuclear alternatives. The Group is to submit a final report on these aspects to the Board, if possible, within 18 months. It will also advise the Board on the factors involved in the operation of an international service for PNE and on the agreements envisaged by Article V of NPT. Thirty-nine States attended the first meeting of the Group in September 1975.

107. The fourth technical committee on PNE was held in Vienna in January 1975 [8]. Work is proceeding on an English-French-Russian glossary of PNE terms and an up-dated bibliography on PNE, due for publication in 1976.

[8] See Agency publication STI/PUB/414.

NUCLEAR SAFETY AND ENVIRONMENTAL PROTECTION

General

108. By the end of 1975 the 176 commercial nuclear power reactors operating in Member States had accumulated a total of more than 1000 reactor years. Some plants had been in operation for as many as twenty years, several for more than ten. In this time there have been a number of incidents including a serious fire at one nuclear power plant in 1975. However, no fatal accident deriving from the nuclear side of any of these power plants has been reported during the entire period.

109. The experience of previous years of operation is providing further data on which to base more effective standards and guidelines, eliminate shortcomings in design or materials and to maintain the safety record of the nuclear power industry. One of the principal objectives of the Agency's work under this heading is to help maintain this record and to help in solving the problems on management and disposal of nuclear wastes, particularly high-level and alpha-bearing radioactive wastes.

110. During 1975 the main emphasis in the Agency's programme continued to be placed upon the preparation of codes and guides for light-water nuclear power plants, upon the management of high-level and alpha-bearing wastes (including criteria for selecting sites for their disposal in suitable geological formations) and on establishing authorized limits for the discharge of radioactive materials to the environment.

Nuclear safety

111. Good progress was made in preparing the first five codes of practice under the nuclear safety standards project and the eight safety guides to implement these codes which deal with the following subjects:

(a) Governmental organization for nuclear safety;

(b) Siting of nuclear power plants;

(c) Design of nuclear power plants;

(d) Operation of nuclear power plants; and

(e) Quality assurance of nuclear power plants.

112. During the year, the Agency sent out siting and safety missions to Brazil, Indonesia, Iran, Israel, the Republic of Korea, Kuwait, Mexico, Pakistan, Singapore and Turkey. The work of these missions was supplemented by four training courses and one study tour dealing especially with the requirements and procedures for licensing nuclear plant and other regulatory work. These programmes were intended especially for countries embarking on nuclear power.

Radiological safety

113. The Agency prepared additional guides for implementing its Regulations for the Safe Transport of Radioactive Materials [9]. It is preparing a guidebook on planning for emergencies in nuclear plants. For the preparation of this guide the Secretariat, with the help of an advisory group of experts, is studying the basic problems of protecting the public in the event that a serious accident led to a significant release of radioactive contaminants. To this end a seminar on the diagnosis and treatment of incorporated

[9] 1973 Revised edition. Agency publication STI/PUB/323.

radionuclides was held which emphasized the role of chelating agents (special chemical compounds which make chemical complexes with heavy metals) for the treatment of individuals with incorporated plutonium and some other transuranic elements. The proceedings of the seminar are in the process of being published.

114. Guidance is also being prepared on the first aid treatment to be given in the case of a radiation accident, on the decontamination of nuclear plant and on radiological safety in uranium and thorium mines and mills.

115. To ensure compliance with the discharge limits, referred to in paragraph 110 above, the Agency has prepared guides on how to measure normal and accidental discharges of radioactive material at the point where they are released to the environment (e. g. the stack).

116. The Agency is also preparing a co-operative study with the States concerned (Austria, Bulgaria, Czechoslovakia, the Federal Republic of Germany, Hungary, Romania, the Soviet Union and Yugoslavia) of the problems caused by the release of radioactive material in the Danube catchment area.

Waste management

117. With the help of an advisory group the Agency is examining the factors to be considered in selecting sites for repositories of solidified high-level and alpha-bearing wastes in suitable geological formations.

118. During the year the Agency completed work on a code of practice on the management of wastes from the mining and milling of uranium and thorium ores. Work in progress includes a code of practice on the management of radioactive wastes at nuclear power plants and on guidelines for storing, handling and transport of irradiated fuel at the reactor site. On the recommendation of the expert committee concerned, the Agency has suspended work on the question of establishing a register of radioactive wastes committed to storage and disposal.

119. In 1975 the Agency held three symposia on environmental problems. The first at Stockholm in June, in co-operation with NEA, dealt with the combined effects of radioactive, non-radioactive and thermal releases into the environment. The second at Otaniemi, Finland, in July, dealt with the radiological effects of releases from nuclear plant into the sea, rivers and other aquatic systems. The third, held in co-operation with the United States at San Francisco in November, dealt with the effects of releases of plutonium and other transuranic nuclides into the environment. The first two symposia indicated that no harmful effects to man from nuclear facilities have so far been observed. All three symposia offered important new data and concepts for consideration in the decision-making and standards-setting process. The proceedings of the three symposia have been published.

Joint IAEA/IIASA Project on Risk Evaluation

120. This project, started in 1974, is aimed at understanding better how societies judge the acceptability of new technologies and how to take account in decision-making of objective information on risks and the expected response of society towards them. Twenty-one reports and papers have been published on the preliminary results of the study, chiefly through IIASA channels. In June/July an advisory meeting brought together nuclear technicians, public information officers and social behavioural scientists to discuss public acceptance of nuclear power.

The International Nuclear Information System (INIS)

121. During 1975 the 46 participating Member States and 13 international organizations contributed more than 63 000 items of nuclear information. Work proceeded throughout the year on the conversion of INIS into an international nuclear science abstracting service. From September 1975, when abstracts were first included in the INIS output products, until the end of the year 11 000 abstracts in machine-readable form were distributed to the national information centres and printed in "INIS Atomindex". All abstracts are in English; a second version of the abstract in one of the official languages of the Agency will also be printed, if it is supplied by the national INIS Centre. Thus some Member States have assumed an additional translation workload as part of their participation in INIS. An experimental issue of "INIS Atomindex" in its proposed new format as an international abstracting journal was published in October 1975.

122. The Agency also carried out experiments using remote on-line computer terminals in order to obtain experience with teleprocessing, evaluate its usefulness and ascertain the requirements for teleprocessing within the INIS framework. Applications being studied include the interactive retrieval of information from the INIS files, as well as the entry and editing of data.

123. An INIS/AGRIS training seminar was held in Ankara from 12 to 20 June 1975. It was organized jointly by the Agency and FAO and consisted of nine courses (in indexing, retrieval and descriptive cataloguing) which were attended by 79 participants from 33 countries and six international organizations. The seminar showed that the two systems, INIS and AGRIS, which are closely related, have a high degree of compatibility, and that joint training efforts are of mutual benefit.

Computer services

124. The computer at the Agency's Headquarters provides services to over 100 individual users from most Divisions of the Agency as well as from UNIDO. During the year an additional disk storage device and three remote job entry stations were acquired for the IBM 370/145 system.

SAFEGUARDS

General

125. The Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, which met from 5 to 30 May, expressed strong support for effective Agency safeguards. The Conference paid special attention to export policies, standard and universal application of the Agency's safeguards, improvement of methods and techniques and safeguards instruments and the physical protection of nuclear material against forcible seizure.

126. The Director General has set up a Standing Advisory Group on safeguards implementation to provide advice on technical aspects of Agency safeguards. The Group held its first meeting in December 1975 and began its examination of verification procedures and safeguards practices.

127. The Board has taken a number of steps to clarify the scope and duration of safeguards agreements concluded outside the framework of NPT and of safeguards requirements in connection with the transfer of scientific and technological information. These steps have been reflected in recent agreements.

128. The Agency has also helped Member States to set up their national systems of accounting for, and control of, nuclear material and has given training to staff who are responsible for submitting accounting information to the Agency under safeguards agreements in connection with NPT.

129. The part of the safeguards information handling system which deals with reports received from States' systems of accounting and control on nuclear material subject to safeguards under NPT, is now handling reports from some States party to NPT and is being tested for the remainder.

130. The Agency convened the third symposium on the safeguarding of nuclear material in October 1975. The symposium reviewed the "state of the art" in safeguards methods, techniques and instrumentation and it attracted wide participation.

Implementation of Agency safeguards

131. At the end of 1975 the Agency had safeguards agreements in force with 64 States. The Board had also approved agreements with 17 further States, which are awaiting entry into force.

132. Of the agreements in force 44 were with States party to NPT and 23 of these States have significant nuclear activities (see Table 8 at the end of this section). In addition, safeguards were being applied in 20 States under 11 project agreements, 21 safeguards transfer agreements and eight unilateral submission agreements (see Table 9).

133. During 1975 the Board approved:

(a) In connection with NPT, safeguards agreements with Afghanistan, Ethiopia, Gabon, Japan, the Republic of Korea, Sudan, Sweden and Tonga;

(b) In connection with both NPT and the Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty), safeguards agreeements with El Salvador and Honduras;

(c) A Safeguards Transfer Agreement between the Agency, Israel and the United States of America;

(d) A Safeguards Agreement between the Agency, France and the Republic of Korea;

(e) An agreement with Argentina for the application of safeguards to the Embalse Power Reactor Facility; and

(f) Two agreements with Spain and Switzerland respectively for the application of safeguards to nuclear material.

134. The negotiation of agreements to implement the offers of the United Kingdom and the United States in connection with the application of safeguards in those two States had entered the final stage.

135. The Agency's records showed the following quantities of nuclear material to be under Agency safeguards:

	1970	1971	1972	1973	1974	1975
Plutonium (kg)						
(a) Contained in irradiated fuels						6 661
(b) In other forms						2 374
(c) Total	770	1 726	2 900	4 730	6 300	9 035
Enriched uranium						
(a) Total element (tonnes)	243	522	1 178	1 865	2 305	3 096
(b) Fissile content (tonnes)	6.1	11.2	26.0	43.0	53.0	66.7
Source material (tonnes)	1 146	1 200	2 145	3 370	3 910	4 440

136. During 1975 the Agency carried out 515 inspections in 39 States (216 in connection with NPT), compared with 474 inspections (165 in connection with NPT) in 38 States during the preceding year. Of the 515 inspections, 214 were made of power plants, 104 of bulk fuel plants and 197 of other facilities including research reactors.

137. Inspectors are being trained in the use of recently introduced non-destructive analytical instruments and techniques and this has improved further the quality of verification.

138. By the end of 1975 the compilation of individual "Safeguards Implementation Practices" enabling the Agency to achieve consistency of inspection procedure in respect of all facilities where nuclear material was being safeguarded, was well underway. [10]

139. A list of nuclear installations under Agency safeguards or containing material safeguarded under arrangements approved by the Board is given in Table 10. The breakdown on 31 December 1975 compared to 30 June of the same year is as follows:

[10] See also document GC(XIX)544, para. 141.

Facilities	NPT		Non-NPT	
	30 June	31 December	30 June	31 December
Nuclear power stations	18	18	25	25[11]
Research reactors and critical facilities	47	47	56	56
Conversion plants, fabrication plants and fuel reprocessing plants	7	7	22	22
Other separate accountability areas[12]	47	47	93	93

Safeguards development

140. An Advisory Group on States Systems of Accounting for and Control of Nuclear Material met at Brno, Czechoslovakia, in July 1975 and extended the work of the panel held in Tokyo in November 1973 [13].

141. An advisory group which met in April 1975 prepared a revised set of recommendations [14] to help Member States to minimize the risk of sabotage in nuclear facilities or theft of nuclear material. The Secretariat is studying the legal instruments that might be appropriate for ensuring physical protection of nuclear material, particularly when it is transported internationally.

142. The construction of the Safeguards Analytical Laboratory at Seibersdorf was completed in November 1975 and work on certain categories of samples was expected to begin early in the new year.

143. In March 1975 an advisory group helped to draw up guidelines for the development of safeguards techniques during the next five years. During the year, containment and surveillance systems have been further refined, particular attention being paid to optical devices, instruments to monitor the movement of material in nuclear plants and techniques for sealing. There has also been further progress in techniques for non-destructive measurement of the fissile material content of fuel assemblies and irradiated fuel.

144. The cost of research and technical contracts awarded during 1975 amounted to $699 790, of which 15% was contributed by the Agency and the remainder by the institutes or Governments concerned. A co-ordinated research programme for setting up a bank of correlated isotopic data was started with Member States and EURATOM. The data bank will be used to develop isotopic correlation techniques and to apply them as a means of verification of burn-up production of fissile material and reprocessing input analysis.

145. Volume E of the Agency's safeguards technical manual was released for production in 1975.

[11] The basis for this number has been changed since 1975; it now relates only to nuclear power stations that have been subject to inspection during the year under review, whether or not they have started operation.

[12] Contiguous minor locations where very small amounts of nuclear materials are kept have been grouped together.

[13] See document GC(XVIII)/525, para.165.

[14] Document INFCIRC/225.

Table 8

Situation on 31 December 1975 with respect to the signature of, ratification of, or accession to, NPT by non-nuclear-weapon States, and the conclusion of safeguards agreements between the Agency and these States in connection with NPT

Non-nuclear-weapon States which have signed, ratified or acceded to NPT[a] (1)	Date of ratification or accession[a] (2)	Safeguards agreement with the Agency (3)
Afghanistan	4 February 1970	Approved by the Board
Australia	23 January 1973	In force: 10 July 1974
Austria	28 June 1969	In force: 23 July 1972
Bahamas	10 July 1973	
Barbados		Under negotiation
Belgium	2 May 1975	Signed: 5 April 1973
Benin	31 October 1972	
Bolivia	26 May 1970	Signed: 23 August 1974
Botswana	28 April 1969	Under negotiation
Bulgaria	5 September 1969	In force, 29 February 1972
Burundi	19 March 1971	Under negotiation
Cambodia	2 June 1972	
Canada	8 January 1969	In force: 21 February 1972
Central African Republic	25 October 1970	
Chad	10 March 1971	
China, Republic of	27 January 1970	Negotiations discontinued
Colombia		
Costa Rica	3 March 1970	Signed: 12 July 1973
Cyprus	16 February 1970	In force: 26 January 1973
Czechoslovakia	22 July 1969	In force: 3 March 1972
Democratic Yemen		
Denmark	3 January 1969	In force: 1 March 1972
Dominican Republic	24 July 1971	In force: 11 October 1973
Ecuador	7 March 1969	In force: 10 March 1975
Egypt		
El Salvador	11 July 1972	In force: 22 April 1975
Ethiopia	5 February 1970	Approved by the Board
Fiji	14 July 1972	In force: 22 March 1973
Finland	5 February 1969	In force: 9 February 1972
Gabon	19 February 1974	Approved by the Board
Gambia	12 May 1975	
German Democratic Republic	31 October 1969	In force: 7 March 1972
Germany, Federal Republic of	2 May 1975	Signed: 5 April 1973
Ghana	5 May 1970	In force: 17 February 1975
Greece	11 March 1970	Provisionally in force: 1 March 1972
Grenada	19 August 1974	Under negotiation
Guatemala	22 September 1970	Under negotiation
Haiti	2 June 1970	Signed: 6 January 1975
Holy See	25 February 1971	In force: 1 August 1972
Honduras	16 May 1973	In force: 18 April 1975
Hungary	27 May 1969	In force: 30 March 1972
Iceland	18 July 1969	In force: 16 October 1974
Indonesia		
Iran	2 February 1970	In force: 15 May 1974
Iraq	29 October 1969	In force: 29 February 1972
Ireland	1 July 1968	In force: 29 February 1972
Italy	2 May 1975	Signed: 5 April 1973
Ivory Coast	6 March 1973	
Jamaica	5 March 1970	Under negotiation
Japan		Approved by the Board
Jordan	11 February 1970	Signed: 5 December 1974
Kenya	11 July 1970	Under negotiation
Korea, Republic of	23 April 1975	In force: 14 November 1975
Kuwait		
Laos	20 February 1970	Under negotiation

(1)	(2)	(3)
Lebanon	15 July 1970	In force: 5 March 1973
Lesotho	20 May 1970	In force: 12 June 1973
Liberia	5 March 1970	
Libyan Arab Republic	26 May 1975	
Luxembourg	2 May 1975	Signed: 5 April 1973
Madagascar	8 October 1970	In force: 14 June 1973
Malaysia	5 March 1970	In force: 29 February 1972
Maldives	7 April 1970	Under negotiation
Mali	5 March 1970	Under negotiation
Malta	6 February 1970	Under negotiation
Mauritius	28 April 1969	In force: 31 January 1973
Mexico	21 January 1969	In force: 14 September 1973
Mongolia	14 May 1969	In force: 5 September 1972
Morocco	30 November 1970	In force. 18 February 1975
Nepal	5 January 1970	In force: 22 June 1972
Netherlands b/	2 May 1975	Signed: 5 April 1973
New Zealand	10 September 1969	In force: 29 February 1972
Nicaragua	6 March 1973	Signed: 28 February 1975
Nigeria	27 September 1968	Under negotiation
Norway	5 February 1969	In force: 1 March 1972
Panama		
Paraguay	4 February 1970	
Peru	3 March 1970	Under negotiation
Philippines	5 October 1972	In force: 16 October 1974
Poland	12 June 1969	In force: 11 October 1972
Republic of South Viet-Nam	10 September 1971	In force: 9 January 1974
Romania	4 February 1970	In force: 27 October 1972
Rwanda	20 May 1975	
San Marino	10 August 1970	Under negotiation
Senegal	17 December 1970	
Sierra Leone	26 February 1975	Under negotiation
Singapore		Under negotiation
Somalia	5 March 1970	Under negotiation
Sri Lanka		
Sudan	31 October 1973	Signed: 26 February 1975
Surinam b/		In force: 5 June 1975
Swaziland	11 December 1969	In force: 28 July 1975
Sweden	9 January 1970	In force: 14 April 1975
Switzerland		Under negotiation
Syrian Arab Republic	24 September 1969	
Thailand	7 December 1972	In force: 16 May 1974
Togo	26 February 1970	
Tonga	7 July 1971	Approved by the Board
Trinidad and Tobago		
Tunisia	26 February 1970	Under negotiation
Turkey		
United Republic of Cameroon	8 January 1969	
Upper Volta	3 March 1970	
Uruguay	31 August 1970	Signed: 24 September 1971
Venezuela	26 September 1975	
Western Samoa	18 March 1975	
Yemen Arab Republic		
Yugoslavia	3 March 1970	In force: 28 December 1973
Zaire	4 August 1970	In force: 9 November 1972

a/ The information reproduced in columns (1) and (2) was provided to the Agency by the depositary Governments of NPT, and an entry in column (1) does not imply the expression of any opinion on the part of the Secretariat concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

b/ Agreements have also been concluded in respect of the Netherlands Antilles and Surinam, under NPT and Additional Protocol I to the Treaty for the Prohibition of Nuclear Weapons in Latin America. These agreements entered into force on 5 June 1975. By letter of 29 November 1975, the Prime Minister of Surinam, which attained independence on 25 November 1975, informed the Secretary-General of the United Nations that his Government acknowledged that treaty rights and obligations of the Government of the Kingdom of the Netherlands in respect of Surinam were succeeded to by the Republic of Surinam upon independence and that it was desired that it be presumed that each treaty has been legally succeeded to by the Republic of Surinam and that action be based upon this presumption until a decision was reached that it should be regarded as having lapsed.

Table 9

Agreements providing for safeguards other than those
in connection with NPT,
approved by the Board as of 31 December 1975

Party(ies)[a]	Subject	Entry into force	INFCIRC
Project Agreements			
Argentina	Siemens SUR-100	13 Mar 1970	143
	RAEP Reactor	2 Dec 1964	62
Chile	Herald Reactor	19 Dec 1969	137
Finland[b]	FiR-1 Reactor	30 Dec 1960	24
	FINN sub-critical assembly	30 Jul 1963	53
Greece[b]	GRR-1 Reactor	1 Mar 1972	163
Indonesia	Additional core-load for Triga Reactor	19 Dec 1969	136
Iran[b]	UTRR Reactor	10 May 1967	97
Japan	JRR-3	24 Mar 1959	3
Mexico[b]	TRIGA-III Reactor	18 Dec 1963	52
	Siemens SUR-100	21 Dec 1971	162
	Laguna Verde Nuclear Power Plant	12 Feb 1974	203
Pakistan	PRR Reactor	5 Mar 1962	34
	Booster rods for KANUPP	17 Jun 1968	116
Philippines[b]	PRR-1 Reactor	28 Sep 1966	88
Republic of South Viet-Nam	VNR-1 Reactor	16 Oct 1967	106
Romania[b]	TRIGA Reactor	30 Mar 1973	206
Spain	Coral I Reactor	23 Jun 1967	99
Turkey	Sub-critical assembly	17 May 1974	212
Uruguay	URR Reactor	24 Sep 1965	67
Venezuela	RV-1 Reactor	7 Nov 1975	
Yugoslavia[b]	TRIGA-II	4 Oct 1961	32
	KRSKO Nulcear Power Plant	14 Jun 1974	213
Zaire[b]	TRICO Reactor	27 Jun 1962	37
Transfer Agreements (Agreements for transfer of safeguards under bilateral co-operation agreements between the indicated Parties)			
Argentina/United States of America		25 Jul 1969	130
Australia[b]/United States of America		26 Sep 1966	91
Australia[b]/Japan		28 Jul 1972	170/Corr.1
Austria[b]/United States of America		24 Jan 1970	152
Brazil/United States of America		20 Sep 1972	110/Mod.1
Canada/Japan		12 Nov 1969	85/Mod.1
Canada[b]/India		30 Sep 1971	211
China, Republic of/United States of America		6 Dec 1971	158
Colombia/United States of America		9 Dec 1970	144
France/Japan		22 Sep 1972	171
France/Korea, Republic of[b]		22 Sep 1975	
India/United States of America		27 Jan 1971	154
Indonesia/United States of America		6 Dec 1967	109
Iran[b]/United States of America		20 Aug 1969	127
Israel/United States of America		4 Apr 1975	

Party(ies)[a]	Subject	Entry into force	INFCIRC
Japan/United States of America		10 Jul 1968	119
Japan/United Kingdom		15 Oct 1968	125
Korea, Republic of/United States of America		19 Mar 1973	111/Mod. 1
Pakistan/Canada		17 Oct 1969	135
Philippines[b]/United States of America		19 Jul 1968	120
Portugal/United States of America		19 Jul 1969	131
South Africa/United States of America		28 Jun 1974	98
Spain/United States of America		28 Jun 1974	92
Sweden[b]/United States of America		1 Mar 1972	165
Switzerland/United States of America		28 Feb 1972	161
Turkey/United States of America		5 Jun 1969	123
Venezuela/United States of America		27 Mar 1968	122
Unilateral submissions			
Argentina	Atucha Power Reactor Facility	3 Oct 1972	168
	Nuclear material	23 Oct 1973	202
	Embalse Power Reactor Facility	6 Dec 1974	224
Chile	Nuclear material	31 Dec 1974	
China, Republic of	Taiwan Research Reactor Facility	13 Oct 1969	133
Mexico[b]	All nuclear activities	6 Sep 1968	118
Panama[c]	All nuclear activities		
Spain	Nuclear material	19 Nov 1974	218
	Nuclear material	18 Jun 1975	221
Switzerland	Nuclear material		
United Kingdom	Certain nuclear activities	14 Dec 1972	175

a/ An entry in this column does not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

b/ Application of Agency safeguards under this agreement has been suspended as the State has concluded an agreement in connection with NPT.

c/ At present Panama has no significant nuclear activities. The Agreement is concluded under Article 13 of the Treaty for the Prohibition of Nuclear Weapons in Latin America.

Table 10

Nuclear installations under Agency safeguards or containing safeguarded material under agreements approved by the Board of Governors[a]

A. Research reactors and critical facilities

State[b]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Argentina	RA-O	Cordoba	Tank	0.00	x
	RA-1	Constituyentes	Argonaut	0.12	x
	RA-2	Constituyentes	Argonaut	0.03	x
	RA-3	Ezeiza	Pool-tank	5.00	x
	RA-4	Rosario	Solid-homogeneous	0.00	x
Australia[c]	HIFAR	Lucas Heights, N.S.W.	Tank	11.00	x
	MOATA	Lucas Heights, N.S.W.	Argonaut	0.01	x
	CF	Lucas Heights, N.S.W.	Critical Facility	0.00	x
Austria[c]	SAR	Graz	Argonaut	0.00	x
	TRIGA-VIENNA	Vienna	Triga II	0.25	x
	ASTRA	Seibersdorf	Pool	12.00	x
Brazil	IEA-R1	São Paulo	Pool	5.00	x
	IPR-R1	Belo Horizonte	Triga I	0.10	x
	RIEN.1	Rio de Janeiro	Argonaut	0.01	x
Bulgaria[c]	IRT-2000	Sofia	Pool	2.00	x
Canada[c]	NRX	Chalk River, Ont.	NRX	30.00	x
	NRU	Chalk River, Ont.	NRU	125.00	x
	WR-1	Pinawa, Manitoba	Organic-cooled	60.00	x
	McMaster	Hamilton, Ont.	Pool-type	2.5	x
	Slowpoke - Toronto	Univ. of Toronto	Pool-type	0.00	x
	Slowpoke - Ottawa	Ottawa, Ont.	Pool-type	0.02	x
	PTR	Chalk River, Ont.	Pool-type	0.00	x
	ZED-2	Chalk River, Ont.	Pool-type	0.00	x
	ZEEP	Chalk River, Ont.	Tank	0.00	x
Chile	Herald	Santiago	Herald	5.00	x
China, Republic of	THOR	Hsin-chu	Pool	1.00	x
	TRR	Huaitzupu	NRX	40.00	x
	ZPRL	Lung-Tan	Pool	0.01	x
	THAR	Hsin-chu	Argonaut	0.01	x
	MER	Hsin-chu	Mobile Educational Reactor	0.00	x
Colombia	IAN-R1	Bogotá	Pool-type	0.02	x
Czechoslovakia[c]	SR-O	Vochov	Critical Facility	0.00	x
	VVR-S	Rez	Tank	4.00	x
	TR-O	Rez	Critical Facility	0.00	-
Denmark[d]	DR-1	Risø	Homogeneous	0.00	x
	DR-3	Risø	Tank	10.00	x
Finland[c]	FiR-1	Otaniemi	Triga II	0.25	x
German Democratic Republic[c]	WWR-S(M)	Rossendorf	Tank	6.00	x
	RRR and RAKE	Rossendorf	Critical Facility	0.00	x
Greece[c]	GRR-1	Athens	Pool	5.00	x

State[b]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Hungary[c]	WWR-SM	Budapest	Tank	5.00	x
	ZR-4 and ZR-6	Budapest	Critical Facility	0.00	x
	Training reactor	Budapest	Pool	0.01	x
Indonesia	PRAB (TRIGA II)	Bandung	Triga II	1.00	x
Iran[c]	TSPRR	Teheran	Pool	5.00	x
Iraq[c]	IRT-2000	Baghdad	Pool	2.00	x
Israel	IRR-1	Soreq	Pool	5.00	x
Japan	AHCF	Tokai-Mura	Critical Facility	0.00	x
	DCA	Oarai-Machi	Critical Facility	0.00	x
	FCA	Tokai-Mura	Critical Facility	0.01	x
	HTR	Kawasaki-shi	Pool	0.10	x
	JMTR	Oarai-Machi	Tank	50.00	x
	JMTR-CA	Oarai-Machi	Critical Facility	0.00	x
	JPDR	Tokai-Mura	Boiling-water	90.00	x
	JRR-2	Tokai-Mura	Tank	10.00	x
	JRR-3	Tokai-Mura	Tank	10.00	x
	JRR-4	Tokai-Mura	Pool	1.00	x
	Kinki University	Kowakai	UTR-B	0.00	x
	KUR	Kumatori-cho	Pool	5.00	x
	KUCA	Kumatori-cho	Critical Facility	0.00	x
	NSRR	Tokai-Mura	Triga (pulse)	0.3	-
	Musashi College of Technology	Kawasaki-shi	Triga II	0.10	x
	NAIG-CA	Kawasaki-shi	Critical Facility	0.00	x
	Rikkyo University	Nagasaka	Triga II	0.10	x
	SHCA	Tokai-Mura	Critical Facility	0.00	x
	TCA	Tokai-Mura	Critical Facility	0.00	x
	TODAI	Tokai-Mura	Fast Neutron Source Reactor	0.002	x
	TTR	Kawasaki-shi	Pool	0.10	x
	"Mutsu" (Nuclear Ship)	Minato-Machi Mutsu	PWR	36.00	x
	JOYO	Oarai	EBR	50.00	-
Korea, Republic of[c]	KRR - TRIGA II	Seoul	Triga II	0.10	x
	KRR - TRIGA III	Seoul	Triga III	2.00	x
Mexico[c]	Centro Nuclear de Mexico	Ocoyoacac	Triga III	1.00	x
	Training reactor facility	Mexico City	SUR-100	0.00	x
Norway[c]	JEEP-II	Kjeller	Tank	2.00	x
	HBWR	Halden	HBWR	25.00	x
Pakistan	PARR	Rawalpindi	Pool	5.00	x
Philippines[c]	PRR-1	Diliman, Quezon City	Pool	1.00	x
Poland[c]	EWA	Świerk	Tank	8.00	x
	Anna and Agata	Świerk	Critical Facility	0.00	x
	Maria	Świerk	Tank	30.00	x
Portugal	RPI	Sacavem	Tank	1.00	x
Romania[c]	VVR-S	Margurele	Tank	10.00	x
South Africa	SAFARI-1	Pelindaba	Tank	20.00	x

State[b/]	Abbreviated name	Location	Type	Capacity MW(th)	In operation
Spain	JEN-1 and JEN-2	Madrid	Pool	3.00	x
	CORAL-1	Madrid	Fast Critical Facility	0.00	x
	ARBI	Bilbao	Argonaut	0.01	x
	ARGOS	Barcelona	Argonaut	0.01	x
Sweden[c/]	R2 and R2-O	Studsvik	Tank and Pool	50.00	x
	KRITZ and R-O	Studsvik	Critical Facility	0.00	x
Switzerland	Proteus	Würenlingen	Critical Facility	0.00	x
	Saphir	Würenlingen	Pool	5.00	x
	Diorit	Würenlingen	HW	30.00	x
	Crocus	Lausanne	Pool	0.00	x
	AGN201P	Geneva	Solid homogeneous	0.00	x
	AGN211P	Basel	Pool	0.00	x
Thailand[c/]	TRR-1	Bangkok	Pool	1.00	x
Turkey	TR-1	Istanbul	Pool	1.00	x
United Kingdom	Zebra	Winfrith	Critical Facility	0.00	x
Uruguay[c/]	RUDI	Montevideo	Lockheed	0.10	-
Yugoslavia[c/]	Triga II	Ljubljana	Triga II	0.25	x
	RA and RB	Vinča	Heavy-water Critical Facility	6.5	x
Zaire[c/]	Triga	Kinshasa	Triga II	1.00	x

B. Nuclear power stations

State[b/]	Name of power station	Location	Type	Capacity MW(e)	In operation
Argentina	Atucha Nuclear Power Station	Atucha	PHWR	319	x
	Cordoba Nuclear Power Station	Rio Tercero	Candu	600	-
Austria[c/]	Tullnerfeld	Tullnerfeld	PWR	700	-
Bulgaria[c/]	Kozloduy I	Kozloduy	PWR	880	x
Canada[c/]	Pickering (4 units)	Pickering, Ontario	Candu	2032	x
	NPD	Ralphton, Ontario	Candu	22	x
	Gentilly	Gentilly, Quebec	Candu	250	x
	DPGS	Kincardine, Ontario	Candu	208	x
	Bruce I	Douglas Point, Ontario	Candu	750	-
China, Republic of	FNPS-1	Ching-San	BWR	636	-
Czechoslovakia[c/]	A1	Bohunice	HWGC	143	x
Finland[c/]	Loviisa	Loviisa	PWR	880	-
German Democratic Republic[c/]	Rheinsberg PWR	Rheinsberg	PWR	80	x
	Bruno Leuschner PWR	Greifswald	PWR	880	x
India	Tarapur - TAPS	Tarapur	BWR	380	x
	Rajasthan - RAPS	Rajasthan	Candu	400	x (for 200)
Japan	Tokai	Tokai-Mura	Magnox	154	x
	Tsuruga	Tsuruga	BWR	357	x
	Mihama-1	Mihama-Fukai	PWR	340	x
	Mihama-2	Mihama-Fukai	PWR	500	x
	Fukushima-1	Okuma-Fukushima	BWR	460	x
	Fukushima-2	Okuma-Fukushima	BWR	784	x
	Fukushima-3	Okuma-Fukushima	BWR	784	x
	Fukushima-5	Fukushima	BWR	784	-
	Shimane	Kashima-cho	BWR	460	x
	Hamaoka 1	Hamaoka	BWR	540	x
	Takahama-1	Takahama	PWR	826	x
	Takahama-2	Takahama	PWR	826	x
	Genkai-1	Kyushu	PWR	559	x
	Mihama-3	Mihama-Fukui	PWR	826	-
Korea[c/]	Kori-1	Kori	PWR	564	-
Mexico[c/]	Laguna Verde Power Station	Laguna Verde, Vera Cruz	BWR	650	-
Pakistan	KANUPP	Karachi	Candu	125	x
Spain	José Cabrera	Almonacid de Zorita	PWR	153	x
	Santa Maria de Garona	Province de Burgos	BWR	440	x
Sweden[c/]	Oskarshamn I	Oskarshamn	BWR	440	x
	Oskarshamn II	Oskarshamn	BWR	580	x
	Ringhals I	Near Göteborg	BWR	760	x
	Ringhals II	Near Göteborg	PWR	830	x
	Barsebäck I	Near Malmö	BWR	580	x
Switzerland	Mühleberg	Mühleberg	BWR	306	x
	Beznau I	Beznau	PWR	350	x
	Beznau II	Beznau	PWR	350	x

C. Conversion plants, fabrication plants and chemical reprocessing plants including pilot plants

Argentina	Pilot Fuel Fabrication Plant, Constituyentes[e/] Scrap Reprocessing Plant, Buenos Aires[e/]
Brazil	Fabrication Facility, Metallurgy Department, Instituto de Energia Atomica, São Paulo
Canada[c/]	Eldorado Nuclear Limited Port Hope Refinery Westinghouse Fuel Fabrication Plant Canadian General Electric Pelletizing Facility Canadian General Electric Fuel Fabrication Plant
China, Republic of	INER Pilot Fuel Reprocessing Plant[e/] INER Fuel Fabrication Plant
Denmark[d/]	Metallurgy Department, Risø[e/]
India	Nuclear Fuel Complex – NFC (Enriched Uranium Conversion and Fabrication Plant), Hyderabad
Japan	Power Reactor & Nuclear Fuel Development, Reprocessing Plant Nuclear Fuel Industries Ltd. (Kumatori-1) Sumitomo Metal Mining Co. Ltd. (Tokai-1) Mitsubishi Atomic Power Industries (Ohmiya-1) Japan Nuclear Fuel Co. Ltd. Mitsubishi Nuclear Fuel Co. Ltd. Power Reactor and Nuclear Fuel Development Co. (Tokai) Pilot Fuel Fabrication Plants and Conversion Plants: Mitsubishi Atomic Power Industries (Ohmiya-2)[e/] Nuclear Fuel Industries Ltd. (Kumatori-2)[e/] Nuclear Fuel Industries Ltd. (Ohi)[e/] Nuclear Fuel Industries Ltd. (Takeyama-2)[e/] Sumitomo Metal Mining Co. Ltd. (Tokai-2)[e/] Mitsubishi Metal Co.[e/] Sumitomo Metal Mining Co. Ltd. (Central)[e/]
Norway[c/]	Fuel Element Pilot Production Plant, Kjeller[e/]
Spain	Pilot Reprocessing Plant, Juan Vigon Research Centre, Madrid[e/] Metallurgical Plant, Juan Vigon Research Centre, Madrid[e/]
Sweden[c/]	ASEA-ATOM, Conversion and Fabrication Plant, Västerås

D. Other accountability areas covering more than one effective kilogram of nuclear material

Australia[c/]	Research Laboratory, Lucas Heights
Canada[c/]	Chalk River Nuclear Laboratories
Czechoslovakia[c/]	Research Laboratories, Rez
German Democratic Republic[c/]	Miscellaneous Locations combined in one material balance area
Hungary[c/]	Institute of Isotopes
Japan	Tokyo University (Tokai)
Poland[c/]	Institute of Nuclear Research, Świerk Miscellaneous Locations combined in one material balance area
Sweden[c/]	Central Hot Laboratory, Studsvik Laboratories and storages, Studsvik (except for KRITZ and RO) Miscellaneous Locations combined in one material balance area
Switzerland	Federal Institute of Reactor Research, Würenlingen
United Kingdom	Zebra Storage Facility, Winfrith Windscale Storage Facility, Windscale
United States of America	Argonne National Laboratory

a/ The nuclear installations that will be covered by the Safeguards Agreement in connection with NPT, signed with EURATOM and the non-nuclear-weapon States members of EURATOM on 5 April 1973, are not listed here.

b/ An entry in this column does not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

c/ NPT Safeguards Agreement.

d/ Denmark joined EURATOM on 1 January 1973 and has signed the Agreement with EURATOM and its non-nuclear-weapon member States; however, Agency safeguards are presently applied in this State under the NPT Safeguards Agreement which Denmark had concluded with the Agency prior to joining EURATOM.

e/ Pilot plant.

External and legal matters

146. A large part of the work done under this heading consisted of negotiations of safeguards agreements and services in support of nuclear safety and environmental protection work. The Agency provided legal advice to Yugoslavia on legislation and regulations for licensing nuclear power plants and related matters. It helped Jordan and Kuwait to prepare legislation on radiation protection. It published a survey of the licensing requirements and regulatory controls of nuclear plants in a number of Member States [15]. This comprised a selection of papers presented at Agency meetings on nuclear law held in 1973 and 1974.

Meeting programme

147. Comparative information on the Agency's meeting programme for the years 1974 and 1975 is given in Table 11 below.

Table 11

Meetings convened by the Agency

Item	1974	1975
Conferences, symposia and seminars	13	14
Participants	2236	2111
Countries taking part	77	60
Papers presented	710	564
Other meetings (Technical committees, advisory groups etc.)	116	116

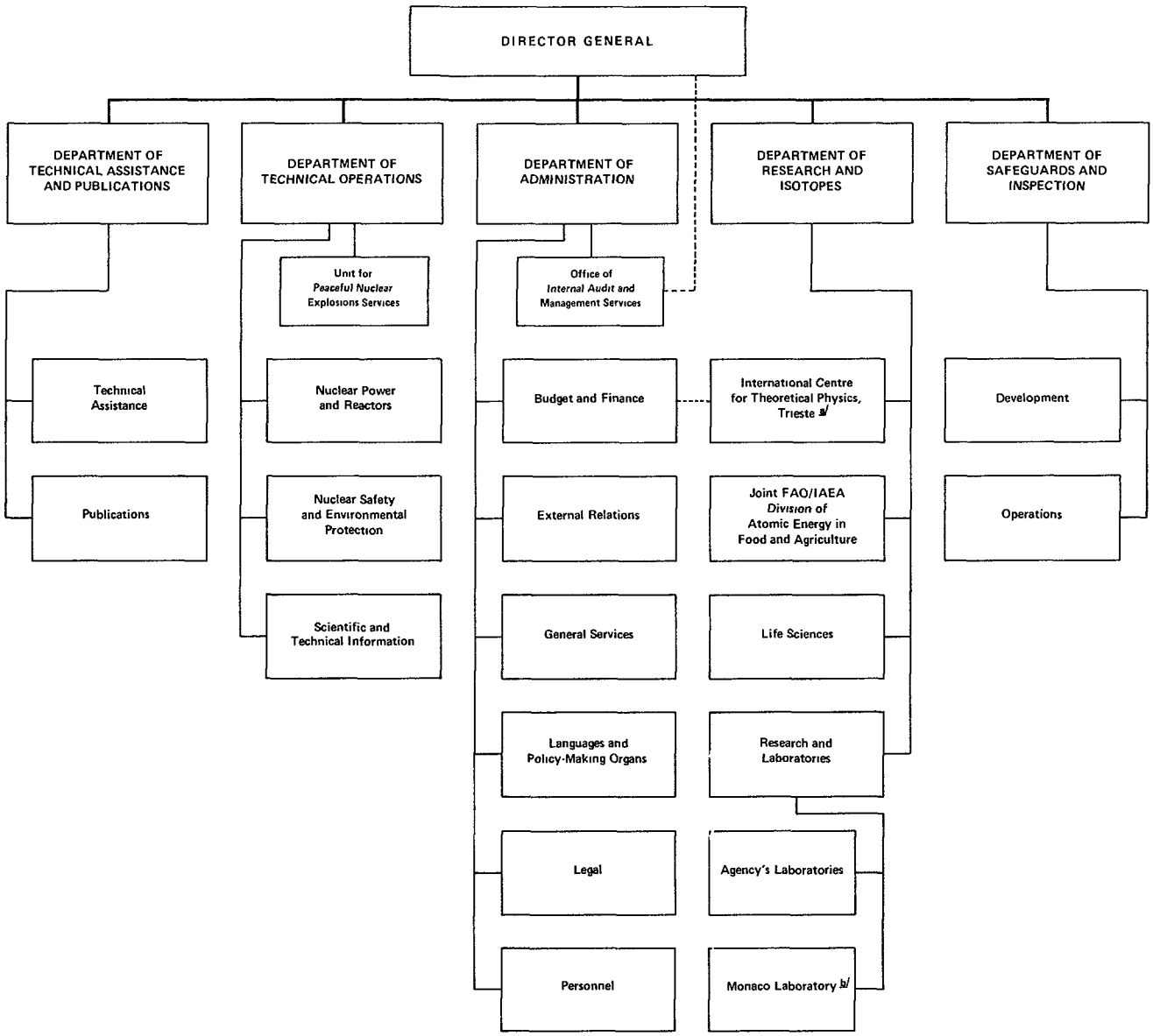
Personnel

148. On 31 December 1975 the Secretariat had 390 staff members in the Professional and higher categories, 648 in the General Service category and 242 in the Maintenance and Operatives Service category. The number of nationalities represented among that portion of staff which is subject to geographical distribution was 58 as compared to 56 on 31 December 1974.

149. The following organizational chart shows the structure of the Secretariat as at 31 December 1975.

[15] "Licensing and Regulatory Control of Nuclear Installations", Legal Series No.10, 1975 (Agency publication STI/PUB/421).

ORGANIZATIONAL CHART



a/ Jointly operated by the Agency and UNESCO
b/ With the increasing participation of UNESCO and UNEP

BUDGETARY PERFORMANCE

Comparison of budget estimates with actual cost by programme with an explanation of major differences

150. In accordance with the recommendation of the Ad Hoc Committee of Experts to Examine the Finances of the United Nations and the Specialized Agencies, a budgetary performance report has been included each year since 1967 as Part V of the Agency's annual accounts [16]. Since the annual report will henceforth cover the calendar year, information on budgetary performance during that year will from now on be included in the report.

151. The purpose of this information is to provide a succinct comparison between the approved programme budget [17] and the actual obligations incurred during the year as well as a brief explanation of any major differences and of the use made of available resources to cover any unforeseen expenditure. The tables in this part of the report are presented in the same order as that followed by the appropriation Sections in the Regular Budget.

152. The original programme estimates for 1975 were based on an exchange rate of 21 Austrian schillings to the United States dollar. However, when the Board approved the estimates, the rate of exchange had changed to 18.25 schillings to the dollar. On the assumption that the average rate of exchange for 1975 would be 18.50 schillings to the dollar, the Board included an additional $2.8 million to adjust the programme cost estimates. In 1974 the General Conference approved the Regular Budget for 1975 at a level of $29 675 000.

153. In the light of a subsequent further fall in the schilling value of the dollar, and in view of unforeseen increases in the emoluments of staff in all categories, as well as additional financial requirements resulting from the expansion of INIS, the Conference approved, at the Board's request, a supplementary appropriation of $2.5 million.

154. During the latter part of 1975, the schilling value of the dollar rose again and as a result of this and of economy measures applied throughout the year, only $610 527 of the supplementary appropriation approved by the Conference was, in fact, required to fund the implementation of the approved programme.

155. The Board of Governors has authorized the Director General to make the necessary transfers between appropriation Sections. The actual amount transferred is shown in each table of programme cost as a one line adjustment to the original budget estimate.

156. The programme estimates for 1975 provided for the cost of 6.5 classes of post adjustment for staff in the Professional and higher categories [18], and an increase of 6% was foreseen in the salaries and wages of staff in the General Service and Maintenance and Operatives Service categories.

157. Because of the changes referred to above in the dollar/schilling exchange rate and continuing inflation, the purchasing power of salaries of staff in the Professional and higher categories declined, and it proved necessary to approve nearly six additional classes of post adjustment to offset this decline. The changes in the exchange rate also made it necessary to provide more dollars so as to maintain the level in Austrian schillings of the salaries and wages of staff in the General Service and Maintenance and Operatives Service categories.

---

[16] See the Agency's Accounts for 1967 (document GC(XII)/384).

[17] See Resolutions GC(XVIII)/RES/314 and GC(XIX)/RES/324.

[18] A "class" of post adjustment means the fixed percentage of net base salary which is added to that salary for each 5% rise in the cost of living above the base level, as shown by the movement of the post adjustment index.

158. Two additional unforeseen developments affected salaries and wages and, consequently, all programmes. In the light of action taken by the General Assembly of the United Nations, the salaries of staff in the Professional and higher categories were increased by approximately 6% on 1 January 1975. As a result of a reduction of Austrian income tax the net incomes of salaried personnel in Austria increased, and it was necessary to make a corresponding adjustment in the salaries and wages of staff in the General Service and Maintenance and Operatives Service categories which are based upon the "best prevailing local rates". Common staff costs were also affected by the changes in the dollar/schilling exchange rate but to a lesser degree than salaries, chiefly because the number of Professional staff actually recruited was smaller than foreseen and this resulted in a lower cost of recruitment, travel, removal expenses and installation grants.

159. The cost of common services, supplies and equipment bore the full impact of changes in the exchange rate as well as continuing inflation.

160. The following table provides a comparison of budget estimates with actual costs by appropriation Sections.

Table 12

Appropriation Section	Original appropriation	Authorized transfers	Actual obligations
1. Policy-making organs	958 000	150 272	1 108 272
2. Executive management and administration	3 729 000	833 033	4 562 033
3. Common services	2 918 000	668 196	3 586 196
4. Technical assistance and training	1 285 000	185 956	1 470 956
5. Research and isotopes	3 839 000	434 002	4 273 002
6. Operational facilities	2 310 000	581 604	2 891 604
7. Technical operations	7 034 000	397 831	7 431 831
8. Safeguards	4 802 000	159 633	4 961 633
9. Contingent financing	2 800 000	(2 800 000)	-
Original appropriations	29 675 000	610 527	30 285 527
Supplementary appropriation required to meet price increases	610 527	(610 527)	-
Sub-total – actual obligations	30 285 527	-	30 285 527
Balance of unused supplementary appropriation	1 889 473	-	-
TOTAL	32 175 000	-	30 285 527

Section 1. Policy-making organs

Table 13

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	77 000	104 205	(27 205)
Overtime	4 000	8 932	(4 932)
Temporary assistance	7 000	11 911	(4 911)
Salaries and wages	88 000	125 048	(37 048)
Common staff costs	25 000	30 855	(5 855)
Common services, supplies and equipment	49 500	81 091	(31 591)
Other items of expenditure:			
Linguistic services	659 000	739 625	(80 625)
Printing and publishing services	126 000	121 103	4 897
Other	10 500	10 550	(50)
Sub-total	958 000	1 108 272	(150 272)
Adjustment of programme cost estimates	150 272	-	150 272
TOTAL	1 108 272	1 108 272	-

161. The overrun under salaries and wages resulted from the general increase in staff costs. Actual obligations for common services, supplies and equipment exceeded the original estimate by $31 591. The difference is largely attributable to increased cost for communications and utilities as well as an underestimation of requirements for public information activities in connection with the session of the General Conference.

Section 2. Executive management and administration

Table 14

Sub-item of appropriation Section	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
(a) Executive management and technical programme planning	638 000	782 723	(144 723)
(b) Administration	2 976 000	3 641 303	(665 303)
(c) Service and support activities	115 000	138 007	(23 007)
Sub-total	3 729 000	4 562 033	(833 033)
Adjustment of programme cost estimates	833 033	-	833 033
TOTAL	4 562 033	4 562 033	-

162. Individual programmes included under the appropriation Section are presented in the following tables and explanatory notes.

2(a) Executive management and technical programme planning

Table 15

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	409 500	472 541	(63 041)
Consultants	16 200	48 202	(32 002)
Overtime	4 300	6 368	(2 068)
Temporary assistance	500	2 537	(2 037)
Salaries and wages	430 500	529 648	(99 148)
Common staff costs	131 200	141 494	(10 294)
Travel	36 500	43 806	(7 306)
Meetings:			
Technical committees, advisory groups	17 000	23 293	(6 293)
Representation and hospitality	22 800	21 991	809
Other items of expenditure:			
Linguistic services	-	20 331	(20 331)
Printing and publishing services	-	2 160	(2 160)
Sub-total	638 000	782 723	(144 723)
Adjustment of programme cost estimates	144 723	-	144 723
TOTAL	782 723	782 723	-

163. Actual obligations for consultants include the remuneration under a Special Service Agreement for the Special Adviser to the Director General, which was originally included under established posts. Consequently the overruns under established posts and common staff costs are below the average increase.

164. The overrun under meetings resulted from two sessions of the Scientific Advisory Committee in 1975, whereas only funds for one session were provided in the original 1975 budget estimates.

165. Expenditures in respect of linguistic services and printing and publishing services reflect mainly cost of work performed for the Scientific Advisory Committee. No provision for this type of expenditure was made in the budget.

2(b) Administration

Table 16

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 899 000	2 308 894	(409 894)
Consultants	600	24 680	(24 080)
Overtime	3 500	2 288	1 212
Temporary assistance	10 700	21 959	(11 259)
Salaries and wages	1 913 800	2 357 821	(444 021)
Common staff costs	614 500	688 995	(74 495)
Travel	28 800	41 351	(12 551)
Meetings:			
Technical committees, advisory groups	12 000	-	12 000
Representation and hospitality	11 400	10 041	1 359
Common services, supplies and equipment	141 000	122 383	18 617
Other items of expenditure:			
Linguistic services	125 000	244 822	(119 822)
Printing and publishing services	160 000	207 109	(47 109)
Other	62 500	64 781	(2 281)
Transfer to Safeguards (Legal services)	(93 000)	(96 000)	3 000
Sub-total	2 976 000	3 641 303	(665 303)
Adjustment of programme cost estimates	665 303	-	665 303
TOTAL	3 641 303	3 641 303	-

166. Payments under Special Service Agreements to a consultant for the Legal Division and to a consultant for the Division of Personnel were not foreseen in the budget estimates. Overruns in staff costs are below the average increase due to delays in recruitment to fill vacant posts.

167. The advisory group meeting on regulatory requirements for the clearance of irradiated food for human consumption which was included in the budget list of meetings has not been held.

168. Starting 1975 the mailing cost for the Agency's bulletin and for other printed matter is included under the item printing and publishing services and no longer under common services as foreseen in the budget. The budgetary provision for mailing cost was approximately $18 000.

169. The budget estimates for linguistic services did not provide sufficient funds to cover all translation services required, especially for public information activities.

2(c) Service activities

170. This programme consists of the two sub-programmes which are dealt with separately below. Since each sub-programme is solely concerned with the provision of services in support of the Agency's functional programmes, the total cost in each case is entirely apportioned between those programmes which require the services.

Linguistic services

Table 17

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 347 000	1 487 285	(140 285)
Overtime	4 500	9 886	(5 386)
Temporary assistance	186 700	257 408	(70 708)
Salaries and wages	1 538 200	1 754 579	(216 379)
Common staff costs	436 500	445 687	(9 187)
Travel	300	233	67
Other items of expenditure:			
Linguistic services	(1 975 000)	(2 200 829)	225 829
Printing and publishing services	-	330	(330)
TOTAL	-	-	-

171. This sub-programme consists of interpretation and translation and records services.

172. The relatively low staff cost reflects the result of delaying recruitment for vacant posts, necessitating on the other hand employment of temporary assistance staff over and above the budget estimates.

Printing and publishing services

Table 18

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 140 000	1 408 550	(268 550)
Overtime	30 000	20 543	9 457
Temporary assistance	67 700	32 551	35 149
Salaries and wages	1 237 700	1 461 644	(223 944)
Common staff costs	369 100	421 764	(52 664)
Travel	1 000	600	400
Representation and hospitality	200	5	195
Scientific and technical contracts	11 000	6 695	4 305
Common services, supplies and equipment	395 000	606 356	(211 356)
Other items of expenditure:			
Linguistic services	140 000	4 500	135 500
Printing and publishing services	(2 039 000)	(2 363 557)	324 557
Sub-total	115 000	138 007	(23 007)
Adjustment of programme cost estimates	23 007	-	23 007
TOTAL	138 007	138 007	-

173. The cost of printing and publishing services is apportioned to the programmes for which they are provided. The balance remaining under this programme represents the cost of reimbursable services rendered to UNIDO under contractual arrangements.

174. Based on a plan of action for the publishing of documents related to Nuclear Safety Codes of Practice, Safety Guides and Users' Manuals a provision was included in the original budget estimate for temporary assistance and overtime requirements for editing and printing. Due to a slowdown of the step-by-step process of collating and developing safety codes and guides, the reproduction of documents was delayed. In addition, the high quality of documents prepared with the aid of experts did not require editing as originally foreseen. Accordingly, the resources provided for the in the budget were not utilized. The underrun under overtime and temporary assistance reflects this situation.

175. Actual obligations for common services, supplies and equipment include mailing cost of printed matter, such as proceedings of meetings and other publications for all programmes of about $85 000, which were not provided for under this service. The balance of the overrun is solely attributable to price increases due to currency fluctuation and inflation.

176. The budget estimate provided for translation services of printed matters, such as the Agency's bulletin, circular letters, etc. By the application of direct costing the expenses related to translation were directly charged to the relevant programme. The charge remaining under this item represents the translation cost related to the publications catalogue.

Section 3. General services

Table 19

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 288 500	1 591 808	(303 308)
Overtime	17 000	26 025	(9 025)
Temporary assistance	3 500	20 426	(16 926)
Salaries and wages	1 309 000	1 638 259	(329 259)
Common staff costs	417 400	474 689	(57 289)
Travel	500	108	392
Representation and hospitality	100	41	59
Scientific and technical contracts	35 000	8 000	27 000
Common services, supplies and equipment	810 000	1 355 745	(545 745)
Other items of expenditure:			
Linguistic services	39 000	6 580	32 420
Printing and publishing services	307 000	102 774	204 226
Sub-total	2 918 000	3 586 196	(668 196)
Adjustment of programme cost estimates	668 196	-	668 196
TOTAL	3 586 196	3 586 196	-

177. The overruns in respect of established posts and overtime are due to the general increase in staff costs. The increase in cost for temporary assistance is partly due to temporary replacements for staff on extended sick leave and partly to the fact that from 1975 onwards the sick leave refund from the Austrian Social Security for staff in the General Service and Maintenance and Operatives Service categories is no longer credited to the temporary assistance account but included under miscellaneous income.

178. The budgetary overrun under common services, supplies and equipment reflects the impact of exchange rate fluctuations and inflation; especially telephone rates were increased by approximately 30% and gas heating cost by about 60%. In addition the actual obligations include cost of maintenance and other services in respect of the new premises in the Wasagasse as well as of office furniture which was ordered with a view to assessing its suitability as standard furniture for the permanent headquarters.

179. As a result of refinement of cost accounting all identifiable internal administrative printing services, i.e. forms, reports, etc., were directly charged to the relevant programmes and not to General services as originally foreseen.

Section 4. Technical assistance and training[a/]

Table 20

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	792 500	956 364	(163 864)
Consultants	31 000	9 741	21 259
Overtime	1 300	398	902
Temporary assistance	4 800	19 919	(15 119)
Salaries and wages	829 600	986 422	(156 822)
Common staff costs	257 800	285 794	(27 994)
Travel	53 500	31 230	22 270
Representation and hospitality	1 100	1 001	99
Other items of expenditure:			
Linguistic services	141 000	129 412	11 588
Printing and publishing services	2 000	37 097	(35 097)
Sub-total	1 285 000	1 470 956	(185 956)
Adjustment of programme cost estimates	185 956	-	185 956
TOTAL	1 470 956	1 470 956	-

a/ This table covers expenditures under the Regular Budget only.

180. Additional expenditure for temporary assistance is compensated by lower cost for consultants' services. Substantial savings under travel resulted from lower expenditure for special missions and advisory services.

181. Actual obligations for printing and publishing services include the cost of the Technical Report Series "Nuclear Science Teaching III."

Section 5. Research and isotopes

Table 21

Sub-item of appropriation Section	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
(a) Food and agriculture	1 191 000	1 272 630	(81 630)
(b) Life sciences	1 087 000	1 273 575	(186 575)
(c) Physical sciences	1 561 000	1 726 797	(165 797)
Sub-total	3 839 000	4 273 002	(434 002)
Adjustment of programme cost estimates	434 002	-	434 002
TOTAL	4 273 002	4 273 002	-

182. The budgetary overrun of 11.3% under this appropriation Section is below the average increase in obligations mainly because:

(a) The increase in staff costs is below average as a result of delayed recruitment of staff to fill vacant posts; and

(b) Only 60% of the budgetary provisions for meetings was utilized.

5(a) Food and agriculture

Table 22

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	358 000	436 256	(78 256)
Consultants	20 500	16 612	3 888
Overtime	400	161	239
Temporary assistance	1 500	2 565	(1 065)
Salaries and wages	380 400	455 594	(75 194)
Common staff costs	116 000	130 629	(14 629)
Travel	27 800	19 448	8 352
Meetings:			
Conferences, symposia, seminars	20 000	2 756	17 244
Technical committees, advisory groups	58 000	27 180	30 820
Representation and hospitality	2 500	1 052	1 448
Scientific and technical contracts	315 000	375 588	(60 588)
Common services, supplies and equipment	300	90	210
Other items of expenditure:			
Linguistic services	82 000	74 912	7 088
Printing and publishing services	189 000	185 381	3 619
Sub-total	1 191 000	1 272 630	(81 630)
Adjustment of programme cost estimates	81 630	-	81 630
TOTAL	1 272 630	1 272 630	-

183. The budget estimates provided for two symposia. In fact one seminar was jointly held with FAO, for which the greater portion of the financial support came from that organization. That seminar on the use of induced mutations in improvement of grain legumes production in South East Asia was held in Colombo, Sri Lanka from 8 to 12 December 1975. The participants, coming from 11 countries, strongly recommended that the Agency support a regional research programme on legume improvement. Four advisory group meetings were planned and held but at lower cost to the Agency than foreseen.

184. To a very substantial degree the programme on food and agriculture is implemented by means of a number of co-ordinated research programmes. During 1975, 24 such programmes were being carried out; under them the Agency concluded or renewed 88 research contracts with institutes in Member States. More than four fifths of the total financial resources available are now awarded to institutes in the developing world. In addition a number of institutes in the more industrialized countires supported the co-ordinated research programmes by "cost-free" research agreements. Details of the programmes are given in Table 23 below.

Table 23

Co-ordinated research programmes in food and agriculture

Sub-programme	Title	Number of contracts	Number of agreements
Soil fertility, irrigation and crop production	Fertilizer efficiency studies on grain legumes	9	4
	Isotope-aided micronutrient studies in rice production with special reference to zinc deficiencies	8	2
	Use of isotopes in rice production studies	6	-
	Use of radiation and isotope techniques in studies of soil-water regimes	8	5
	Agricultural nitrogen residues with particular reference to their conservation as fertilizers and behaviour as potential pollutants[a/]	10	9
Plant breeding and genetics	Use of nuclear techniques for seed protein improvement[a/]	18	8
	Use of induced mutations for disease resistance in crop plants[b/]	9	8
	Improvement of vegetatively propagated crops and tree crops through induced mutations	7	4
	Use of radiation-induced mutations in rice breeding and production	1	6
	Improvement of mutation breeding techniques	-	11
	Use of aneuploids for wheat protein improvement	8	-
Animal production and health	Water requirements of tropical herbivores[b/]	8	2
	Isotopes and radiation in animal parasitology and immunology	5	6
	Use of tracer techniques in studies on the use of non-protein nitrogen in ruminants	5	8
	Use of competitive protein binding with labelled steroids and pathology of domestic animals	3	-

Sub-programme	Title	Number of contracts	Number of agreements
Insect and pest control	Fruit fly eradication or control by the sterile-male technique	14	2
Insect and pest control	Use of sterile-male technique for control of lepidopterous insects attacking trees	6	3
	Control or eradication of the tsetse fly by the sterile-male technique[a/]	5	7
Chemical residues and pollution	Isotope tracer-aided studies on the origin and fate of foreign chemical residues in the agricultural environment[b/]	6	4
	Isotope tracer-aided studies of foreign chemical residues in food[b/]	6	2
	Tracer-aided studies of the biological side effects of foreign chemical residues in food and agriculture	6	6
	Isotope tracer-aided studies of chemical residues in cotton seed, oils, feeds and related products[b/]	7	-
Food preservation	Technological and economic feasibility of food irradiation	5	1
	Wholesomeness of the process of food irradiation	6	2
	Radiation preservation of Asian fish and fishery products[a/]	7	-

a/ Funded in part by the Government of the Federal Republic of Germany.

b/ Funded in part by SIDA.

The overrun under "Scientific and technical contracts" is offset by savings under the same item of expenditure in the life sciences programme.

185. Proceedings of two symposia held in 1974 were published during 1975. The subjects concerned are:

(a) Sterility principle for insect control; and

(b) Isotope ratios as pollutant source and behaviour indicators.

186. Eight other publications were issued on the following subjects:

(a) Tracer studies on non-protein nitrogen for ruminants II;

(b) Controlling fruit flies by the sterile-insect technique;

(c) Requirements for the irradiation of food on a commercial scale;

(d) Origin and fate of chemical residues in food, agriculture and fisheries;

(e) Breeding for seed protein improvement using nuclear techniques;

(f) Tracer techniques for plant breeding;

(g) Radiation techniques for water use efficiency studies; and

(h) Root activity patterns of some tree crops.

5(b) Life sciences

Table 24

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	342 900	482 310	(139 410)
Consultants	17 200	24 949	(7 749)
Overtime	300	-	300
Salaries and wages	360 400	507 259	(146 859)
Common staff costs	111 200	144 418	(33 218)
Travel	17 000	21 625	(4 625)
Meetings:			
Conferences, symposia, seminars	40 000	53 771	(13 771)
Technical committees, advisory groups	37 000	14 324	22 676
Representation and hospitality	3 400	2 023	1 377
Scientific and technical contracts	333 000	261 614	71 386
Common services, supplies and equipment	-	1 151	(1 151)
Other items of expenditure:			
Linguistic services	27 000	78 176	(51 176)
Printing and publishing services	158 000	189 214	(31 214)
Sub-total	1 087 000	1 273 575	(186 575)
Adjustment of programme cost estimates	186 575	-	186 575
TOTAL	1 273 575	1 273 575	-

187. With the objective to reduce cost, advisory group meetings were replaced by consultants' meetings, resulting in an overrun under consultants and underrun under technical committees and advisory groups. These consultants' meetings dealt mainly with the new techniques in absolute dose measurement and with the role of radiation genetics in the development of industrially useful micro-organisms.

188. Two symposia and one seminar were held:

(a) An international symposium on advances in biomedical dosimetry, 10-14 March 1975 in Vienna was attended by 139 participants from 31 countries. Travel grants were paid to five participants from developing countries to facilitate their attendance at the meeting;

(b) An Agency/WHO international symposium on biological effects of low level radiation pertinent to protection of man and his environment, 3-7 November in Chicago, United States had 241 participants and 40 observers from 21 countries. A travel grant was paid to four participants from developing countries; and

(c) A seminar on the use of ^{252}Cf in teaching and research was held in Karlsruhe, Federal Republic of Germany from 14 to 18 April 1975.

189. Four advisory group meetings were provided for in the budget and two have been convened whereas the remaining two were replaced by consultant services.

190. To a very substantial degree the programme on life sciences is implemented by means of a number of co-ordinated research programmes. Fifteen such programmes were being carried out; under them the Agency concluded or renewed 58 research contracts with institutes of Member States. In addition, a number of institutes in the more industrialized countries supported the co-ordinated research programmes by "cost-free" research agreements. Details of the programmes are given in Table 25 below.

Table 25

Co-ordinated research programmes in life sciences

Sub-programme	Title	Number of contracts	Number of agreements
Medical applications	In vitro assay techniques	10	1
	In vitro procedures, such as radio-immuno- and radioreceptor assays, in reproductive physiology	4	2
	Joint IAEA/WHO programme on iron nutrition	5	1
	Use of computers for the inter-comparison of scintigraphic techniques	1	19
	Medical applications of activation analysis	4	5
	Use of antigens labelled with radioisotopes in serological epidemiology	3	-
	Comparative methods for the study of trace elements in human nutrition	2	-
Dosimetry	Computer applications in clinical dosimetry	2	2
	Development of a transfer instrument for neutron dosimetry intercomparison	1	6
	Reactor in-pile chemical dosimeter intercomparison and standardization	2	-
Radiation biology	Radiation sterilization of bio-medical materials and biological tissues	6	2
	Use of nuclear techniques in the preparation of vaccines against parasitic diseases	3	4
	Improvement in radiotherapy of cancer using modifiers of radio-sensitivity of cells	5	2
	Radiation induced chromosomal aberrations for genetic risk evaluation in man	7	3
	Neutron activation analysis of pollutants in human hair using research reactors	2	-

191. Proceedings for four symposia held in 1974 and in 1975 were published during 1975. The subjects concerned are:

(a) Dynamic studies with radioisotopes in medicine;

(b) Radiosterilization of medical products; and

(c) Biochemical dosimetry.

Another publication was issued on the subject "Nuclear techniques in helminthology research".

5(c) Physical sciences

Table 26

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	615 000	773 918	(158 918)
Consultants	36 200	26 753	9 447
Temporary assistance	-	5 939	(5 939)
Salaries and wages	651 200	806 610	(155 410)
Common staff costs	199 100	231 521	(32 421)
Travel	36 700	39 206	(2 506)
Meetings:			
Conferences, symposia, seminars	55 000	20 697	34 303
Technical committees, advisory groups	74 000	50 389	23 611
Representation and hospitality	5 000	1 506	3 494
Scientific and technical contracts	172 000	188 625	(16 625)
Scientific supplies and equipment	19 000	1 396	17 604
Common services, supplies and equipment	6 000	8 000	(2 000)
Other items of expenditure:			
Linguistic services	45 000	68 615	(23 615)
Printing and publishing services	298 000	310 232	(12 232)
Sub-total	1 561 000	1 726 797	(165 797)
Adjustment of programme cost estimates	165 797	-	165 797
TOTAL	1 726 797	1 726 797	-

192. Temporary assistance was required to meet the increased number of requests for nuclear data.

193. The budget provided funds for one symposium and three seminars; however, only the symposium on the use of high-level radiation in waste treatment - status and prospects was convened in Munich, Federal Republic of Germany from 17 to 21 March 1975. There were 155 participants from 26 countries; three participants from developing countries received a travel grant to facilitate their attendance at the meeting. Eleven advisory groups and technical committees had been planned but only eight meetings were held.

194. To a large degree the programme on physical sciences is implemented through a number of co-ordinated research programmes. During 1975 five such programmes were being carried out; under them the Agency concluded or renewed 43 research contracts with institutes in Member States. More than four fifths of the total financial resources available are now awarded to institutes in the developing world. In addition a number of institutes in the more industrialized countries supported the co-ordinated research programme by "cost-free" research agreements. Details of the programmes are given in the table below.

Table 27

Co-ordinated research programmes in physical sciences

Sub-programme	Title	Number of contracts	Number of agreements
Physics	Elemental analysis by charged particle induced X-rays	5	3
	Application of research reactor neutron scattering techniques in the study of solids	8	-
Industrial applications and chemistry	Nuclear based techniques in geology and mineral prospecting	1	3
	Nuclear based methods for trace-elements analysis	4	2
	Rapid methods for the quality control of radiopharmaceuticals	1	3

195. Only a minor amount has been spent for the purchase of nuclear targets requested by laboratories in developing countries for nuclear data measurements. The total amount foreseen in the budget could not be spent due to delivery difficulties of the limited number of suppliers.

196. Proceedings of two symposia and one conference held in 1974 and 1975 were published during 1975. The subjects concerned are:

(a) Thermodynamics of nuclear materials;

(b) Plasma physics and controlled nuclear fusion research; and

(c) Radiation for a clean environment.

197. Eight other publications were issued on the following subjects:

(a) Neutron standard reference data;

(b) Radiation engineering in the academic curriculum;

(c) International directory of certified radioactive materials;

(d) Laboratory Manual on the use of radiotracer techniques in industry and environmental pollution;

(e) Environmental isotope data No.5: World survey of isotope concentration in precipitation;

(f) Reference methods for marine radioactivity studies II;

(g) CINDA 74, Supplement; and

(h) CINDA 75, Volume I.

Section 6. Operational facilities

Table 28 [a/]

Sub-item of appropriation Section	Approved 1975 budget	Actual 1975 obligations	Overrun( ) or underrun of budget
(a) The Laboratory	1 698 000	1 984 359	(286 359)
(b) International Centre for Theoretical Physics	220 000	386 000	(166 000)
(c) International Laboratory of Marine Radioactivity	392 000	521 245	(129 245)
Sub-total	2 310 000	2 891 604	(581 604)
Adjustment of programme cost estimates	581 604	-	581 604
TOTAL	2 891 604	2 891 604	-

a/ This table shows the Regular Budget funds used for the Agency's three operational facilities.

6(a) The Laboratory

Table 29

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 208 000	1 438 210	(230 210)
Overtime	3 700	2 374	1 326
Temporary assistance	1 000	464	536
Salaries and wages	1 212 700	1 441 048	(228 348)
Common staff costs	391 000	429 776	(38 776)
Travel	4 000	5 025	(1 025)
Scientific and technical contracts	11 300	9 708	1 592
Scientific supplies and equipment	213 000	238 386	(25 386)
Common services, supplies and equipment	252 000	219 042	32 958
Other items of expenditure:			
Linguistic services	-	5 568	(5 568)
Printing and publishing services	-	16 255	(16 255)
Transfer to Safeguards	(386 000)	(381 466)	(4 534)
Other	-	1 017	(1 017)
Sub-total	1 698 000	1 984 359	(286 359)
Adjustment of programme cost estimates	286 359	-	286 359
TOTAL	1 984 359	1 984 359	-

198. The budgetary overrun under staff costs is solely due to the currency fluctuations during 1975.

199. The item "scientific supplies and equipment" includes expenditures for supplies and laboratory furniture for the installation of the Safeguards Analytical Laboratory in the amount of $44 600.

200. No budgetary difficulties were experienced under this programme during 1975. In addition to the expenditures under the Agency's Regular Budget shown in the table above, the Laboratory had at its disposal extra-budgetary resources for joint research programmes funded by the Government of the Federal Republic of Germany as follows:

(a) For a joint nitrogen research programme a sum of $156 504;

(b) For a joint protein research programme a sum of $174 764; and for

(c) A joint programme on tsetse fly control a sum of $20 374.

The Government of the United States also contributed an amount of $60 276 to the last programme.

6(b) International Centre for Theoretical Physics

Table 30

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	220 000	267 679	(47 679)
Consultants	16 800	16 216	584
Overtime	6 000	7 127	(1 127)
Temporary assistance	20 000	11 193	8 807
Salaries and wages	262 800	302 215	(39 415)
Common staff costs	71 200	67 034	4 166
Travel	5 000	4 151	849
Meetings:			
Conferences, symposia, seminars	492 000	324 715	167 285
Technical committees, advisory groups	5 500	5 838	(338)
Representation and hospitality	4 500	5 589	(1 089)
Common services, supplies and equipment	170 000	199 137	(29 137)
Other items of expenditure:			
Fellowships	40 000	26 150	13 850
Visiting scientists and lecturers	90 000	121 661	(31 661)
Associate members	104 000	102 306	1 694
Federated institutions	26 000	33 859	(7 859)
Other	-	1 763	(1 763)
Transfer of cost:			
Printing and publishing services	-	157 020	(157 020)
Sub-total	1 271 000	1 351 438	(80 438)
Adjustment of programme cost estimates	166 000	-	166 000
TOTAL	1 437 000	1 351 438	85 562
Source of funds:			
Regular Budget	386 000	386 000	-
Operating Fund I	1 051 000	965 438	85 562
TOTAL	1 437 000	1 351 438	85 562

Table 31

Source of income	1975 Budget	1975 Actual income	Overrun ( ) or underrun of budget
Regular Budget of the Agency	386 000	386 000	-
Contribution from UNESCO	220 000	225 000	(5 000)
Italian Government	350 000	350 000	-
Contribution from UNDP	280 000	284 000	(4 000)
Contribution from SIDA	191 500	111 639	79 861
Other contributions	-	40 127	(40 127)
Miscellaneous income	9 500	23 614	(14 114)
TOTAL	1 437 000	1 420 380	16 620

201. The International Centre for Theoretical Physics is jointly financed by contributions from the Agency's Regular Budget, UNESCO and the Italian Government. In addition funds were available from SIDA and UNDP for specific purposes, such as holding of seminars on specific topics and financing of associated participation of institutions in developing countries.

202. The activities of the Centre are mainly of direct benefit to scientists in developing countries.

203. In addition to the Agency's basic contribution as foreseen in the budget a sum of $157 020 was transferred to this programme to meet the cost incurred for the publication of proceedings of seminars.

204. The budgetary overrun under established posts is due to increased salary costs for General Service staff as well as additional classes of post adjustment for Professional staff, as a result of the high inflation rate in Italy, which is also the reason for increased costs for common services, supplies and equipment.

205. Of the eight extended courses or seminars provided for in the budget, the following six were held:

(a) A nuclear physics research workshop from 8 January through 14 March, with 73 participants, including 45 from developing countries;

(b) A topical meeting on electromagnetic and weak interactions in nuclei from 30 April to 2 May. Of 57 participants, 14 came from developing countries;

(c) A summer course on complex analysis, primarily financed from UNDP and SIDA contributions, from 21 May to 4 August, with 124 participants, including 67 from developing countries;

(d) A solid state workshop from 15 June through 15 September, entirely financed by contributions from UNDP. Of 114 participants, 58 came from developing countries;

(e) A meeting on recent progress on the fundamentals of general relativity from 7 to 11 July; and

(f) The autumn course on physics of oceans and atmosphere from 9 September through 5 December, entirely financed by contributions from UNDP and SIDA. Of 90 participants, 70 came from developing countries.

206. Increased expenditure for visiting scientists and lecturers is more than compensated by the budgetary underrun under meetings.

6(c) International Laboratory of Marine Radioactivity

Table 32

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	304 000	316 566	(12 566)
Consultants	4 200	-	4 200
Salaries and wages	308 200	316 566	(8 366)
Common staff costs	98 900	94 525	4 375
Travel	4 000	6 405	(2 405)
Representation and hospitality	900	-	900
Scientific supplies and equipment	35 000	64 489	(29 489)
Common services, supplies and equipment	15 000	135 010	(120 010)
Other items of expenditure:			
Printing and publishing services	-	1 830	(1 830)
Sub-total	462 000	618 825	(156 825)
Additional income, Operating Fund I	27 580	-	27 580
Adjustment of programme cost estimates	129 245	-	129 245
TOTAL	618 825	618 825	-
Source of funds:			
Regular Budget	521 245	521 245	-
Operating Fund I	70 000	97 580	(27 580)
TOTAL	591 245	618 825	(27 580)

207. On 25 February 1975 the Agency, the Government of Monaco and the Oceanographic Institute at Monaco entered into a new agreement providing for the project on developmental studies on the effects of radioactivity in the sea to be continued until 31 December 1980. [19]

208. Under the terms of the extended agreement the Government of Monaco agreed to make an annual contribution of 320 000 French francs as of January 1975. Additional funds became available under Operating Fund I from a contribution of $7000 from UNESCO.

209. Delayed recruitment of Professional staff to fill vacant posts reduced the unfavourable effect of changes in the United Nations rate of exchange of the French franc to the United States dollar.

[19] See document INFCIRC/129/Rev.1.

210. The budgetary overruns under scientific supplies and equipment and under common services, supplies and equipment are mainly due to costs for major improvements which had not been provided for in the budget. They are partly offset by additional income under Operating Fund I.

211. In addition to the obligations shown in the table above, the Monaco Laboratory incurred expenditures in connection with the studies on non-nuclear pollution in an amount of $96 660 which were defrayed by UNEP.

Section 7. Technical operations

Table 33

Sub-item of appropriation Section	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
(a) Nuclear power and reactors	1 728 000	1 729 165	(1 165)
(b) Nuclear safety and environmental protection	2 309 000	2 266 649	42 351
(c) Information and technical services	2 997 000	3 436 017	(439 017)
Sub-total	7 034 000	7 431 831	(397 831)
Adjustment of programme cost estimates	397 831	-	397 831
TOTAL	7 431 831	7 431 831	-

212. The budgetary overrun of 5.7% under this appropriation Section is significantly below the average increase in obligations because:

(a) The general increase in staff costs was reduced by delayed recruitment of staff to fill vacant posts;

(b) Actual cost for consultants' services remained below the budget estimates;

(c) Only 75% of the budgetary provisions for meetings was utilized; and

(d) Actual obligations for scientific and technical contracts remained 35% below budget estimates.

7(a) Nuclear power and reactors

Table 34

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	795 800	830 955	(35 155)
Consultants	59 200	47 460	11 740
Overtime	600	-	600
Temporary assistance	1 700	2 305	(605)
Salaries and wages	857 300	880 720	(23 420)
Common staff costs	257 800	248 620	9 180
Travel	43 500	36 288	7 212
Meetings:			
Conferences, symposia, seminars	78 000	43 820	34 180
Technical committees, advisory groups	131 500	77 707	53 793
Representation and hospitality	6 900	7 439	(539)
Scientific and technical contracts	98 000	81 377	16 623
Scientific supplies and equipment	500	913	(413)
Common services, supplies and equipment	2 500	2 639	(139)
Other items of expenditure:			
Linguistic services	81 000	91 421	(10 421)
Printing and publishing services	171 000	258 221	(87 221)
Sub-total	1 728 000	1 729 165	(1 165)
Adjustment of programme cost estimates	1 165	-	1 165
TOTAL	1 729 165	1 729 165	-

213. Of the two symposia and three seminars planned, the following two symposia only were held:

(a) A symposium on reliability of nuclear power plants, 14-18 April 1975 in Innsbruck, Austria, which was attended by 213 participants from 40 countries. Travel grants were paid to six participants from developing countries to facilitate their attendance at the meeting; and

(b) An Agency/NEA symposium on gas-cooled reactors with emphasis on advanced systems, 13-17 October 1975 in Jülich, Federal Republic of Germany, which was attended by 307 participants and 81 observers from 21 countries. Travel grants were paid to two participants from developing countries.

In addition an amount of $9 500 was spent for co-sponsoring the sixth international conference on magnetohydrodynamics.

214. Fourteen advisory groups and technical committees had been planned; in fact, sixteen were held but at lower cost than estimated.

215. During 1975 four co-ordinated research programmes were being carried out under the programme of nuclear power and reactors; under them the Agency concluded or renewed 18 research contracts with institutes in Member States. More than four fifths of the financial resources available are now awarded to institutes in the developing world. In addition a number of institutes in the more industrialized countries supported the co-ordinated research programme by "cost-free" research agreements. Details of the programmes are given below.

Table 35

Co-ordinated research programmes in nuclear power and reactors

Sub-programme	Title	Number of contracts	Number of agreements
Nuclear materials resources, exploration, production and demand	Bacterial leaching of uranium ores	6	4
Advanced nuclear power technology and reactor physics	Irradiation embrittlement of pressure vessel steels	-	8
	Fuel burn-up calculations and experiments for thermal reactors	2	1
	Methods in neutron transport theory	2	6

216. Proceedings of three symposia held in 1974 and 1975 were published during 1975. The subjects concerned are:

(a) Formation of uranium ore deposits;

(b) Reliability of nuclear power plants; and

(c) The Oklo phenomenon.

217. Other publications issued during 1975 dealt with the following subjects:

(a) Radon in uranium mining;

(b) Neutron irradiation embrittlement of reactor pressure vessel steels;

(c) Steps to nuclear power;

(d) Nuclear power planning study for Pakistan;

(e) Operating experience with nuclear power stations in Member States in 1974;

(f) Nuclear power planning study for Bangladesh; and

(g) Power reactors in Member States.

7(b) Nuclear safety and environmental protection

Table 36

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	779 400	854 954	(75 554)
Consultants	116 600	63 089	53 511
Overtime	-	293	(293)
Temporary assistance	1 100	8 778	(7 678)
Salaries and wages	897 100	927 114	(30 014)
Common staff costs	252 700	255 323	(2 623)
Travel	104 900	53 705	51 195
Meetings:			
Conferences, symposia, seminars	72 000	52 099	19 901
Technical committees, advisory groups	336 100	290 863	45 237
Representation and hospitality	8 700	5 987	2 713
Scientific and technical contracts	272 000	170 694	101 306
Scientific supplies and equipment	18 000	20 709	(2 709)
Common services, supplies and equipment	17 500	30 505	(13 005)
Other items of expenditure:			
Linguistic services	78 000	191 896	(113 896)
Printing and publishing services	252 000	267 154	(15 154)
Other	-	600	(600)
Sub-total	2 309 000	2 266 649	42 351
Transfer to another programme of appropriation Section 7	(42 351)	-	(42 351)
TOTAL	2 266 649	2 266 649	-

218. Total actual obligations in 1975 were $42 351 less than the approved budget, partly because the financial impact of the programme to develop codes of practice and guides for nuclear safety was considerably lower in 1975 than originally estimated. The savings under this programme were transferred to the programme of information and technical services in the same appropriation Section.

219. Actual obligations for consultants were also kept low because the services of a consultant were made available cost-free by the United States Government in 1975 to assist in the work on the development of nuclear safety standards.

220. Two symposia and two seminars were planned and held, namely:

(a) The Agency/NEA symposium on the combined effects on the environment of radioactive, chemical and thermal releases from the nuclear industry, in Stockholm from 2 to 5 June 1975, with 133 participants from 24 countries. One participant from a developing country was paid a travel grant to facilitate his attendance;

(b) The symposium on radiological impact of releases from nuclear facilities into aquatic environments, 30 June to 4 July 1975 in Otaniemi, Finland had 148 participants from 26 countries. Travel grants were paid to four participants from developing countries;

(c) The seminar on diagnosis and treatment of incorporated radionuclides, 8-12 December, in Vienna had 113 participants from 29 countries. Travel grants were paid to five participants from developing countries; and

(d) The regional seminar on radiological safety aspects of nuclear industry in Rome from 8 to 12 December 1975.

In addition an amount of $6100 was spent on co-sponsoring the symposium on the trans-uranium nuclides, from the standpoint of safety, waste management and environmental considerations, which was organized by the United States authorities in San Francisco in November 1975.

221. Funds for 22 advisory groups and technical committees were provided for in the budget, whereas 26 were held, however, at lower average cost than estimated partially resulting from a decrease in interpretation services and cost-free participation of delegates from Member States. Part of the cost of the advisory group on site selection factors for disposal of solidified high-level and alpha-bearing wastes in geological formations was borne by UNEP.

222. During 1975 six co-ordinated research programmes were being carried out under this programme; under them the Agency concluded or renewed 31 research contracts with institutes in Member States. More than four fifths of the financial resources available are now awarded to institutes in the developing world. In view of the highly specialized fields related to nuclear safety and environmental protection most of the co-ordinated research programmes were supported by cost-free agreements concluded with institutes in more developed countries, resulting in an underrun under scientific and technical contracts. Details of the programmes are given below.

Table 37

Co-ordinated research programmes in nuclear safety and environmental protection

Sub-programme	Title	Number of contracts	Number of agreements
Radiological safety	Environmental monitoring for radiological protection in Asia and the Far East	8	1
Waste management	Study of integrated radioactive waste management systems and their impact on the environment	3	-
	Physical and biological effects on the environment of cooling systems and thermal discharges from nuclear power stations	1	17
	Dispersion of radionuclides from the storage of radioactive wastes under various conditions in the terrestrial environment	3	-
	Cycling of tritium and other radionuclides of global character in different types of ecosystems	5	6
	Marine radioactivity studies	5	7

223. Obligations under common services, supplies and equipment reflect the cost of a training film on "Safe Handling of Plutonium in Research Laboratories" as well as the cost of equipment for the Nuclear Safety Section to be used in connection with the Nuclear Safety Standards programme.

224. Proceedings of three symposia held in 1974 and 1975 were published during 1975. The subjects concerned are:

(a) Environmental effects of cooling systems at nuclear power plants;

(b) Siting of nuclear facilities; and

(c) Combined effects of radioactive, chemical and thermal releases to the environment.

225. Other publications were issued on the subjects listed below:

(a) Peaceful nuclear explosions IV;

(b) Safe handling of radionuclides;

(c) Radiation protection procedures;

(d) Safe handling of plutonium;

(e) Safe use of radioactive tracers in industrial processes;

(f) Objectives and design of environmental programmes for radioactive contaminants;

(g) Training in radiological protection for nuclear programmes; and

(h) Design of radiotracer experiments in marine biological studies.

7(c) Information and technical services

Table 38

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	1 092 000	1 239 847	(147 847)
Consultants	9 500	-	9 500
Overtime	11 000	8 225	2 775
Temporary assistance	18 500	21 670	(3 170)
Salaries and wages	1 131 000	1 269 742	(138 742)
Common staff costs	354 000	370 386	(16 386)
Travel	21 100	21 770	(670)
Meetings:			
Conferences, symposia, seminars	8 000	6 958	1 042
Technical committees, advisory groups	24 500	17 681	6 819
Representation and hospitality	1 700	2 120	(420)
Scientific and technical contracts	49 000	18 583	30 417
Common services, supplies and equipment	1 028 700	1 440 011	(411 311)
Other items of expenditure:			
Linguistic services	106 000	55 173	50 827
Printing and publishing services	313 000	384 728	(71 728)
Data processing	(40 000)	(151 175)	111 175
Other	-	40	(40)
Sub-total	2 997 000	3 436 017	(439 017)
Adjustment of programme cost estimates	396 666	-	396 666
Transfer from another programme of appropriation Section 7	42 351	-	42 351
TOTAL	3 436 017	3 436 017	-

226. One seminar, as provided for in the budget, i.e. the INIS/AGRIS International Training Seminar was held jointly with FAO in Ankara, Turkey from 12 to 20 June 1975. It was attended by 79 participants from 33 countries, and ten participants from developing countries received travel grants from the Agency.

227. The budget provided funds for two technical committees. In fact three such meetings were convened, two of them at cost considerably below average.

228. The budgetary overrun of $411 311 under common services, supplies and equipment reflects in significant part the impact related to currency fluctuations particularly since all expenditures are made in non-dollar currencies. Other factors are the incorporation of machine-readable abstracts in INIS, the publication of Atomindex as an international abstracting service and the further development of the service for supplying documents requiring the acquisition of some items of specialized equipment.

229. To meet the anticipated expansion of this programme funds were provided for the acquisition of additional core-memory of the computer, optical character recognition, specialized electronic typewriters for input processing and specialized reproduction equipment for the publication of the Atomindex including abstracts.

230. Publications included:

(a) Proceedings of a symposium on information systems: Their interconnection and compatibility, held in 1974;

(b) Nuclear Fusion: a journal of plasma physics and thermonuclear fusion and the Atomic Energy Review; and

(c) INIS Atomindex and INIS Reference Series.

231. The costs for data processing services rendered to the Department of Safeguards and Inspection in the amount of $151 175 are considerably above the budget estimates, since a task force established in July 1975 within that Department to increase the effectiveness of the computer-based data processing system, required more computer services than foreseen.

Section 8. Safeguards

Table 39

Item of expenditure	Approved 1975 budget	Actual 1975 obligations	Overrun ( ) or underrun of budget
Established posts	2 268 000	2 375 032	(107 032)
Consultants	17 200	39 873	(22 673)
Overtime	800	205	595
Temporary assistance	-	862	(862)
Salaries and wages	2 286 000	2 415 972	(129 972)
Common staff costs	734 600	709 100	25 500
Travel	317 000	350 638	(33 638)
Meetings:			
Conferences, symposia, seminars	20 000	36 659	(16 659)
Technical committees, advisory groups	49 000	37 342	11 658
Representation and hospitality	7 400	9 323	(1 923)
Scientific and technical contracts	320 000	143 902	176 098
Scientific supplies and equipment	480 000	406 217	73 783
Common services, supplies, and equipment	-	44 226	(44 226)
Other items of expenditure:			
Linguistic services	61 000	122 072	(61 072)
Printing and publishing services	8 000	57 541	(49 541)
Data processing services	40 000	151 175	(111 175)
Laboratory services	386 000	381 466	4 534
Legal services	93 000	96 000	(3 000)
Sub-total	4 802 000	4 961 633	(159 633)
Adjustment of programme cost estimates	159 633	-	159 633
TOTAL	4 961 633	4 961 633	-

232. Since the coming into force of the agreement with EURATOM and Member States of EURATOM and the implementation of safeguards pursuant to the voluntary offers of the United Kingdom and the United States has been delayed the number of inspectors required was not substantially increased in 1975. Accordingly, the number of unfilled posts was greater than expected. Whereas approximately 9 man-years of Professional posts were not funded in 1975, the actual number of about 26 man-years of vacant posts resulted in budgetary savings of about $500 000 under established posts and common staff costs. For this reason the increase of salaries and wages for Safeguards was considerably lower than under other programmes.

233. In order to re-design the computer-based data processing system for the treatment of accounting reports related to facilities, State inventories and movement of nuclear material under safeguards, a task force was formed in July 1975. This task force required consultants' services not provided for in the budget as well as increased data processing services rendered by the Computer Section.

234. The budgetary overrun under travel is mainly related to inspection travel.

235. The budget estimates provided for one symposium only. The holding of an additional seminar on information handling resulted in an overrun of $16 659 under the relevant item of expenditure. The symposium on the safeguarding of nuclear materials, 20-24 October 1975 in Vienna, was attended by 225 participants from 34 countries. Travel grants were paid to eight participants from developing countries to facilitate their attendance at the meeting.

236. Four technical committees and advisory groups were planned and held, but at lower average cost.

237. Under scientific and technical contracts an amount of $152 000 was included in the original budget estimates for analytical services requested under contracts with laboratories in Member States. Actual obligations for this purpose amounted to about $36 000 only.

238. Actual obligations for scientific supplies and equipment include cost of equipment purchased for the Safeguards Analytical Laboratory.

239. Linguistic services as well as printing and publishing services reflect costs of work performed in connection with safeguards agreements under NPT, the Review Conference in Geneva of the Parties to NPT, correspondence with Member States and the publication of an Information Circular [20] on physical protection of nuclear material.

---

[20] INFCIRC/225.

ANNEX

PROGRESS IN THE AGENCY'S WORK CONCERNING THE USE OF NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES

1. In June 1975 the Board of Governors established an Ad Hoc Advisory Group on Nuclear Explosions for Peaceful Purposes. The tasks of the Group are to examine the aspects of nuclear explosions for peaceful purposes (PNE) coming within the Agency's sphere of competence, and to advise the Board on the factors involved in the establishment and operation of an international service for PNE. The Group was also asked to advise the Board, to the extent that the matter is within the Agency's competence, on the structure and content of agreements necessary under Article V of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).[1]

2. The Group held its first meetings on 30 September and 1 October 1975. At those meetings representatives outlined the views of their Governments on PNE in some detail. The Group requested the Director General to arrange for consultants and the Secretariat to study and report on various technical, economic, health and safety and legal aspects of PNE.

3. Basing its discussion on the reports prepared for it, the Group, at its meetings from 31 May to 11 June 1976, prepared a draft of its report on technical, economic and health and safety aspects of PNE together with preliminary material on legal aspects. The Group also prepared a tentative list of principles or matters to be considered in formulating legal instruments relating to PNE. It has requested the Director General to arrange for the Secretariat to undertake a study of the relevant documents and to prepare an analysis of the ways in which the corresponding material could be introduced in international instruments and procedures concerned with PNE. Member States have also been invited to comment on these questions. The analysis will include, where feasible, an elaboration of possible provisions of international instruments and procedures. Its purpose is to assist the Group in the preparation of advice to the Board on the factors involved in the establishment and operation of an international service for PNE and, to the extent that the matter lies within the Agency's sphere of competence, on the structure and content of agreements necessary under Article V of NPT. The Group is proposing to meet again from 8 to 19 November 1976 and will consider the results of the Secretariat's study, together with views received from Member States, at those meetings.

---

[1] Reproduced in document INFCIRC/140.