

THE PROVISION  
OF TECHNICAL ASSISTANCE  
BY THE AGENCY  
WITH SPECIAL REFERENCE  
TO 1977

Report by the Director General

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List of abbreviations

Agency	International Atomic Energy Agency
IAEA	International Atomic Energy Agency
IRRI	International Rice Research Institute
JINR	Joint Institute for Nuclear Research
MW(e)	Megawatt (electric)
PHWR	Pressurized heavy-water-moderated and cooled reactor
PWR	Pressurized light-water-moderated and cooled reactor
SIDA	Swedish International Development Authority
Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
USDA-APHIS	United States Department of Agriculture - Animal and Plant Health Inspection Service
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Byelorussian SSR	Byelorussian Soviet Socialist Republic
German D.R.	German Democratic Republic
Germany, F.R.	Federal Republic of Germany
Korea, R.	Republic of Korea
Libyan A. J.	Libyan Arab Jamahiriya
Syrian A. R.	Syrian Arab Republic
USSR	Union of Soviet Socialist Republics
UK	United Kingdom of Great Britain and Northern Ireland
United Rep. of Cameroon	United Republic of Cameroon
United Rep. of Tanzania	United Republic of Tanzania
USA	United States of America

NOTES

All sums of money are expressed in United States dollars.

The technical assistance described in this report is classified under the following ten fields of activity:

<u>Code</u>	<u>Field of activity</u>
0	General atomic energy development
1	Nuclear physics
2	Nuclear chemistry
3	Prospecting, mining and processing of nuclear materials
4	Nuclear engineering and technology
5	Application of isotopes and radiation in agriculture
6	Application of isotopes and radiation in medicine
7	Application of isotopes and radiation in biology
8	Application of isotopes and radiation in industry and hydrology
9	Safety in nuclear energy

## Part I. INTRODUCTION

1. Following its usual practice, the Board of Governors has requested the communication to the General Conference of the material it used in reviewing the provision of technical assistance by the Agency, with special reference to 1977; this material is accordingly reproduced in the present document. The review was carried out pursuant to paragraph 20 of the Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency.[1]

2. The use of the resources placed at the Agency's disposal, in the form of voluntary contributions, gifts in kind, multi-bilateral funds and UNDP funds for small- and large-scale projects, for the provision of technical assistance is reviewed in this document.

3. The three principal elements of the technical assistance provided are expert services, equipment and fellowships. The main objectives of the assistance are to promote the transfer of skills and knowledge relating to the peaceful uses of atomic energy, to support the efforts made by recipient countries to carry out their atomic energy activities more efficiently and safely and to ensure that the knowledge acquired can continue to be applied after the provision of assistance by the Agency has been completed. The achievement of the latter objective, however, depends largely on the ability of Governments to make adequate facilities available and to recruit and retain the requisite number of qualified staff.

4. In 1977, 73 countries and one regional organization received technical assistance in one form or another from the Agency, as shown in Fig. 4B and Table 7[2]. About 70% of all assistance provided related to nuclear engineering and technology, the application of isotopes and radiation in agriculture, to prospecting, mining and processing of nuclear materials, nuclear physics and to the application of isotopes and radiation in industry and hydrology.

5. The assistance, including assistance in kind, was provided through the services of 388 experts, lecturers and visiting professors, the supply of equipment to a value of about \$3 049 000, and 830 fellowship awards for individual study or for participation in scientific visits, study tours and other short-term training projects.

6. The resources allocated for carrying out the Agency's 1977 technical assistance programme amounted to \$11 586 000 (Table 1), whereas the total value of the technical assistance actually provided in 1977 was \$9 018 000 (Tables 4 and 7), which includes payments against 1977 and prior years' obligations as well as assistance in kind, and represents an increase of \$0.67 million or 2% more than the sum of \$8 337 000 provided in 1976 (Table 4), but does not include the unliquidated obligations and assistance in kind outstanding at the end of the year.

7. As in earlier reports on the provision of technical assistance by the Agency[3], details are given below regarding some areas of technical co-operation of interest to Governments, followed by information concerning UNDP's financial situation, the co-ordination of technical assistance matters with UNDP and technical co-operation among developing countries.

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[1] GC(IV)/RES/65, Annex.

[2] The principal statistical tables are given in Annex I to this document.

[3] See, for example, document GC(XIX)/INF/154, containing information in paragraphs 24-38 on the use of nuclear techniques in industry and hydrology, GC(XX)/INF/161, which contains, in addition to other topics, information in paragraphs 24-30 on technician training, and GC(XXI)/INF/169, which provides information in paragraphs 33-37 on the medical use of in vitro assay procedures with radioactive agents.

## A. SOME SELECTED AREAS OF TECHNICAL CO-OPERATION

### 1. Manpower development for nuclear power projects

8. In the last four reports information was given on the assistance available from the Agency to the developing countries which are considering the introduction of nuclear power.[4] The purpose of highlighting the critical areas of a nuclear power programme is to enable Governments to become more fully aware of what is involved with regard to costs, tasks and planning needs to obtain a reliable and safe source of electricity.

9. The excellent safety record of nuclear power plants to date, while impressive, must be maintained. It is a well-known fact that stringent standards have been established governing, inter alia, the selection of a site for a nuclear power station, the specifications for materials and reactor components, as well as for a facility's operation. Decisions are made on alternative solutions to various problems but not at the expense of safety. In the nuclear power industry's continuous pursuit of excellence perhaps the most crucial issue is that of attracting, training and retaining sufficient numbers of highly qualified staff with sound working experience. The planning and regulatory authorities will have to survey the local situation to determine the likely availability of trained staff of the required quality and quantity before embarking on a nuclear power project. Working together with officials in other governmental departments, the planners will have to establish a manpower development programme; they may have to recommend adjustments in the local educational system, establish schedules for the formation of cadres of specialists and arrange, through bilateral and multilateral programmes, for the provision of the necessary academic and on-the-job training which is not available locally. Help may also be required in setting up training centres for technicians and nuclear power plant operators. These and related activities constitute the integral parts of a manpower development programme for nuclear power.

10. Numerous developing countries have already been confronted with the manpower problems associated with the introduction of nuclear power. Five developing countries already have eight nuclear power plants in operation, with a total output of about 2000 MW(e). These countries, plus 12 other developing countries, have 28 nuclear power reactors under construction, not counting 4 more on order and 16 planned but not yet ordered - all scheduled for operation by 1985. The net output of the 28 reactors under construction totals 17 300 MW(e), whereas those on order or planned will generate an additional 10 300 MW(e). Thus, it can be seen that if these plants are completed on schedule the total installed nuclear power capacity in the developing countries will total 30 000 MW(e) by 1985. Furthermore, about 20 additional developing countries are planning nuclear power stations to be operational prior to the end of the century. A minimum of 293 000 MW(e) and a maximum installed nuclear power capacity of 437 000 MW(e) in the developing countries by the year 2000 has been forecast. One prerequisite to the realization of even the predicted minimum installed capacity is to solve the inherent manpower problems. It has been estimated, for example, that the construction of one 800-1200 MW(e) light-water power reactor at present requires the expenditure of a minimum of 14-15 million man-hours, including about 12 million man-hours' work of craftsmen such as welders, electricians, masons, pipe-fitters and boiler-makers. In addition, well over 1 million man-hours' work of project engineers, quality assurance, surveillance and other project managerial staff is required. However, the operation and maintenance of a nuclear power plant require a staff of 150-200 or more managers, engineers, operators, mechanics, electricians and other craftsmen. Owing to the high capital cost of such a facility and its unique safety requirements, it is essential that highly qualified experienced personnel who understand the technical complexities and requirements of a nuclear power project be available at the very beginning of project planning.

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[4] GC(XVIII)/INF/148, paras 24-40, GC(XIX)/INF/154, paras 8-17, GC(XX)/INF/161, paras 8-23 and GC(XXI)/INF/169, paras 8-32.



(a) Some aspects of manpower development in introducing nuclear power

11. Many developing countries which make fairly extensive use of isotopes and radiation in agriculture, hydrology, industry and medicine, have already set up units whose responsibility is to ensure that the necessary safety standards are observed; in those countries this unit could form the nucleus of a regulatory organization. The regulatory organization would be obliged to expand the scope of its competence significantly should the country decide to embark on a nuclear power programme. To be competent and effective a regulatory organization requires a staff of at least 15 for the first nuclear power project and an expanded staff of about 50 managers, engineers, siting specialists, radiation protection experts and other qualified personnel for a programme encompassing several nuclear power plants. Staffing a regulatory organization with capable personnel, however, does not itself guarantee the competence of this organization. Only when the staff works closely together as a team, keeps itself informed of advances and developments, and gains extensive experience working in power reactors, can this competence be acquired, sustained and improved.

12. The difficulty likely to be experienced in solving these manpower problems, as well as the number and the distribution, by field, of the specialists needed, will vary from country to country, depending, inter alia, on the existing scientific and technical infra-structures. In the graph on page 10 (one hypothetical example of manpower requirements for the construction of a 1000-MW(e) light-water reactor), it can be seen that the first qualified staff is needed 12 years before the reactor fuel is loaded. This graph is not intended to illustrate the manpower requirements for a country's entire nuclear power programme, but only for one project, and in developing countries the numbers may be considerably higher. Thus specialists would be made available from existing staffs, supplemented through fresh recruitment, to carry out regulatory, planning and implementation activities. When no longer needed for a given project, these specialists would move on to other assignments. Mobility between groups can also be assumed; for example, some planning staff might move to "implementation" and later to power plant management.

13. The actual number of specialists and other staff required at the different stages of a nuclear power project may vary even between projects in the same country; nevertheless, the staffing needs for each project must be established at an early date. Only if this is done can the requisite manpower be identified and, where necessary, trained to meet quality standards - it is to be hoped - on schedule. Staffing for a nuclear power project, which is a problem even in the technologically advanced countries, is still more critical in developing countries with a narrow industrial base and a limited supply of the qualified specialists needed.

14. The quality of manpower needed for a nuclear power project is difficult to define and evaluate because standardized guidelines covering such requirements seldom exist at the national level and internationally recognized standards have yet to be formulated. This problem is composed of two very important parts: the quality of formal training and the adequacy of work experience. Educational institutions can provide students with a thorough grounding in the principles onto which nuclear power technology can be grafted. In this connection academic quality can be defined by an academic degree from an educational institution whose curriculum has been accredited by an appropriate body. To ensure that the exacting demands of the nuclear power industry can be met, the structure of the relevant curricula, as well as the teaching staff, laboratories, etc., must be reviewed at regular intervals and updated to maintain quality and a functional balance between theoretical knowledge and the practical application of that knowledge. If this is not done, academic degrees will not be a reliable measure of the quality of the formal education received. A similar problem exists with regard to the assessment of the quality of an individual's work experience. Some position descriptions call for a minimum number of years of qualifying experience. As neither guidelines nor standards exist which define the relative value of work experience, the evaluation of its quality is a highly subjective process. Nevertheless, because of the extreme importance of quality in the staffing for a nuclear power project,



countries should endeavour to define "yardsticks" that can be used in the evaluation of work experience and in the establishment of minimum standards which must be met to qualify for employment and subsequent advancement in this area.

15. Although the graph given on page 10 shows that some staff are needed 12 years before a nuclear power plant produces electricity, it may be necessary for Governments to make changes in their educational systems 15 or more years before, for example, the planners take up their duties, to ensure that these specialists have been trained and are available to carry out the planning functions. For those economic planners who are reluctant to commit scarce funds so far in advance of a decision to "go nuclear", it should suffice to state that the provision of the necessary funds and human resources to achieve this goal would not only benefit scientific and technical programmes relevant to nuclear power but would also be certain to improve the quality of industry and scientific research in general.

16. Governments which start their manpower development planning too late often try to bridge manpower gaps by importing expertise. Although the use of foreign consultants constitutes an invaluable source of advice on numerous problems at various stages of a nuclear power project - in some highly specialized areas it is by far the most economical means of obtaining needed talent - it is highly desirable that the country should have its own qualified staff to plan and carry out all project activities. Having its own trained staff will undoubtedly contribute to the cost effectiveness and self-sufficiency of a country's nuclear power programme. It should also be emphasized that indigenous manpower with the necessary technical background and knowledge of conditions in the country is best equipped to adapt the imported technology to meet local needs and that Agency experts are in a better position than commercial consultants to provide objective advice to regulatory bodies.

17. Governments should be made aware of a further problem; it is not sufficient merely to train staff, it is also necessary to provide financial incentives and create a favourable professional and social environment conducive to career development to be able to retain the staff. The growing world-wide demand for highly qualified personnel in this field makes for keen competition for their services, not to mention the inducements offered by local industry to first-rate talent; this is especially true of firms that bid on sub-contracts for the provision of components not included in the supply contract with the reactor manufacturer.

18. Planners will have to include a sizable training component in respect of the operating staff for the nuclear power plant in the contract with the manufacturer of the reactor. The Government should also be able to count on the exporting country's regulatory organization for assistance in upgrading the technical competence of the importing country's regulatory staff. Moreover, guidance should be available from these sources for the preparation of standards that can be used in evaluating the qualifications of the nuclear power project staff.

(b) The Agency's capability to provide assistance

19. Training courses: Since 1975 more than 400 persons have participated in the Agency's programme of training courses on nuclear power. About three fourths of these participants attended the nuclear power training courses of 12-15 weeks' duration on (i) project planning and implementation and (ii) plant construction and operation management, which were organized under the Agency's regular programme and held at the Argonne National Laboratory (USA), the Kernforschungszentrum Karlsruhe (Federal Republic of Germany) and the Centre d'Etudes Nucléaires Saclay (France). In addition, two-week courses for planners and managers of electrical utilities were held on the economic and technical aspects of nuclear power: the UNDP-financed course held in Jamaica (1975) was organized for participants from all geographic regions, whereas the course conducted in the Philippines (1976) under the regular programme and the UNDP-financed course held in the Republic of Korea (1977) were for participants from the Asia and Pacific region. The latter course emphasized manpower development; manpower requirements, together with manpower development planning and implementation, were analysed in lectures and discussion periods.

20. In 1978 this programme will include eight nuclear power project training courses, to be organized for an estimated 225 participants. Two courses will be repetitions of courses held previously, one will be given on general energy-planning questions and five will be in-depth courses on subjects such as safety analysis review, quality assurance and including a course on nuclear manpower development to be held at the Kernforschungszentrum Karlsruhe. The major topics to be covered during this course at Karlsruhe will be: (i) manpower requirements for all important phases of nuclear power projects and programmes; (ii) manpower development planning and implementation; (iii) manpower training; and (iv) training of nuclear power plant operating personnel. These courses have been conducted up to now in English and French; the first nuclear power project course (planning, development and construction) in Spanish will be offered in 1978 by the Junta de Energía Nuclear in Madrid (Spain).

21. In the future these courses will continue to deal with subjects of interest to the developing countries and to provide training not available from other sources. In addition to nuclear power project planning and implementation, as well as nuclear power plant construction and operational management, the subjects of these training courses will include: (i) safety analysis review, (ii) radiological protection and waste management, (iii) regulatory planning and implementation, (iv) quality assurance, (v) electric system expansion planning, (vi) nuclear manpower development, (vii) nuclear power plant siting, (viii) uranium exploration, (ix) fuel cycle management (involving the use of non-domestic fuel cycle services) and (x) safety and reliability of nuclear power plant operation.

22. Owing to the key position of manpower considerations in any nuclear power programme, all future training courses in this field will include lectures and discussions on, for example, the requirements for qualified manpower, setting up a manpower development programme, methodology based on case histories from developing countries, manpower development scheduling, and the variables that can affect manpower requirements.

23. The Agency's fellowship programme: Of the fellowships provided to candidates nominated by Governments in 1977, nearly one third of total awards was for training in technical areas related to nuclear power and its fuel cycle, as follows:

<u>Subject area</u>	<u>Number of awards</u>
Nuclear power planning and electric system expansion	4
Uranium exploration, ore processing and analysis	36
Nuclear power reactor engineering and maintenance	26
Nuclear fuel technology	15
Reactor instrumentation and control	11
Quality assurance and control, non-destructive testing	4
Reactor safety and evaluation	10
Radiation protection and monitoring	16
Reactor waste management	4
Total	<u>126</u>

24. Agency fellowships cover a wide range of subjects. Some are for training at universities and may entail lecture courses and research, sometimes leading to an advanced degree. Of special interest to nuclear power project managers are fellowships that provide practical experience related to reactor construction, commissioning and operation for professional- and technician-level personnel. This practical experience is usually gained in the form of on-the-job training at project sites abroad. The Agency, realizing that a lack of such training opportunities could cause a serious "bottleneck" in staffing nuclear

power projects with qualified manpower, has made a major effort to secure the co-operation of its more advanced Member States to make on-the-job training opportunities available to the developing countries. It was found that all nuclear power fellowships in 1977 included some element of on-the-job training; as a matter of fact, only 10% of these awards combined academic and practical training; the balance was exclusively on-the-job training benefiting fellows from 27 countries.

25. The Agency has experienced some difficulty in finding an adequate number of on-the-job training opportunities. This is partially understandable because the provision of training of this kind is costly for the host country and may be difficult to arrange; an allied problem is the proprietary nature of information in certain technical areas. In 1977 the Agency requested its Member States that have nuclear power programmes to provide information on the availability of on-the-job training in various technical areas, for use in arranging training for Agency fellows and to assist the developing countries wishing to make bilateral arrangements for training. Positive responses were received from eight Member States, offering more than 160 on-the-job training opportunities; a higher figure can be cited when additional responses become available.

26. The provision of consultants and expert missions: The Agency has provided and will continue to provide advice related to nuclear power programmes. For example, expert posts have been approved to assist in the exploration for nuclear materials in more than 20 countries at present. The use of computer programs, some developed by the Agency, has simplified the study of the feasibility of nuclear power in comparison with other energy sources. Projects on manpower qualification are growing in importance (UNDP large-scale assistance to a project of this kind in Brazil commenced in 1977 and is being executed by the Agency; more than 100 man-months of expert services and equipment valued at \$1.5 million will be provided from UNDP funds over a period of 4-5 years). Although the assignment of individual consultants will continue to be an important source of assistance, it can be foreseen that, in the future, more frequent use will be made of teams of experts for relatively short periods to deal with specific problems. In the past, teams of experts were used primarily for safety missions. In 1977, however, two consultants and an Agency staff member held a two-week seminar on the technical aspects of bid evaluation in Ankara for Turkish officials, and the seminar method was found to be very effective.

(c) Other forms of assistance

27. As a part of its programme of establishing safety codes of practice and guides in connection with the planning, construction and operation of nuclear power plants, the Agency has prepared two draft safety guides on the qualification of personnel, namely, (i) Staffing, recruitment, training and licensing of reactor operating personnel, and (ii) Qualification and training of the regulatory body staff. These guides are in an advanced stage of review and should be published in the near future.

28. The Agency organizes expert groups regularly to ensure the broadest possible participation in the formulation and evaluation of its programme activities. An advisory group on manpower requirements for nuclear power programmes was convened at Agency Headquarters in 1977. Among the topics discussed were the manpower requirements for the main activities of a nuclear power programme, with special reference to the influence of local factors in developing countries and the kind and size of nuclear power projects, and the Agency's programme of training courses on nuclear power. The advisory group also reviewed the Agency's role in promoting nuclear manpower development and suggested means for accomplishing this task. The most important of the objectives which the Agency should pursue in this area are:

- (a) To create a full awareness of the manpower requirements for a nuclear power programme;
- (b) To encourage countries planning to introduce nuclear power to assign highest priority to the initiation of a comprehensive manpower

evaluation programme - beginning at the earliest stages of energy planning - followed by a manpower development programme throughout the entire duration of the nuclear power programme;

- (c) To provide assistance in the organization and implementation of national manpower development programmes and training not available from other sources; and
- (d) To encourage Member States and national and international organizations to develop standardized guidelines in respect of the education, training and qualification of personnel needed for nuclear power programmes.

29. The Agency is compiling information on the experience gained in evaluating manpower requirements for nuclear power projects. This information can be used as guidance in manpower evaluation and development programmes, particularly the data collected from developing countries with practical experience. The Agency has concluded agreements with Argentina and the Philippines governing co-operation in making a manpower development study for the nuclear power programmes in those countries. Argentina has one 319-MW(e) PHWR operating (1974), one 600-MW(e) PHWR under construction (for operation in 1981) and one 600-MW(e) PHWR planned (for operation in 1985), whereas the Philippines has a 600-MW(e) PWR under construction (for operation in 1982). Information on manpower development will be compiled in respect of these projects, as well as in connection with three reactors in Brazil - a 626-MW(e) PWR under construction (for operation in 1978) and two 1294-MW(e) PWRs under construction (for operation in 1983-1984) - where the Agency is executing UNDP large-scale assistance to a project on manpower development for the country's nuclear power programme. This diversity in type and number of reactors, schedules and stages of manpower development should greatly enhance the usefulness of the information that will be compiled. [5] While this information, once available, can be helpful in the evaluation of manpower requirements, it cannot serve as an adequate substitute for a properly organized and comprehensive effort by the officials responsible for defining manpower requirements for nuclear power projects, nor as more than general guidance in identifying the individuals qualified to fill each position or in the planning and scheduling of the additional specialized training needed by individual staff to improve their proficiency and enable them to satisfy standards for their positions.

30. Another aid to developing countries is the Agency publication IAEA-198 entitled "International inventory of training facilities in nuclear power and its fuel cycle". The current edition of this document is based on the information received from Member States as of 31 January 1977; in response to the Agency's request for such information, 19 Member States provided data on their training facilities; this information was supplemented by other material at the Agency's disposal. Inventories of this kind will continue to be compiled and updated for internal use and made available to Governments on request.

## 2. The use of nuclear techniques in agricultural research

31. During the past 20 years the Agency has provided more assistance in the application of isotopes and radiation in agriculture than in any other field of activity. Although the poorer countries are confronted with many development problems, the fact that they have given such high priority to receiving assistance from the Agency to help improve agricultural production is not at all surprising. It is understandable that the "technology gap" is particularly noticeable in countries with traditional, labour-intensive agricultural economies. The need to provide ample supplies of food for growing populations, the migration to the cities and the employment in industry of a sizable share of the rural labour force, and the

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[5] A guidebook on manpower development may also be prepared if a significant body of information becomes available.

need for a reliable source of export earnings are but a few of the factors that motivate the developing countries to introduce more modern and efficient methods in agriculture. The application of known technology, such as the addition of fertilizer at the right time or the use of better seeds and livestock, can result in an immediate and significant increase in productivity. Subsequent gains, however, often require a more modern technology for which greater precision and more efficient research methods are needed.

32. Nuclear technology - the use of isotopic tracers and ionizing radiation - is one of the most effective means available to agricultural scientists for improving productivity. Such methods, used for years on a routine basis by advanced laboratories and experimental farms, have contributed significantly to advances in the soil, plant, animal and food sciences. Several developing countries have already begun to make good use of this technology but many still lack sufficient trained manpower, equipment and the prerequisite scientific base to be able to benefit from it.

33. Rather than promoting the provision of small-scale assistance to agricultural research projects in many institutes within a country and equipping each with the same type of nuclear instruments, it is sometimes better to provide large-scale assistance to a single agricultural research project in a country. This was done in four countries and resulted in the establishment of centralized facilities equipped to serve much of the national food and agricultural research effort; these facilities have developed into "centres of excellence" for the application of nuclear and other modern technology in agricultural research and development.

34. The first of these large-scale assistance projects was carried out by the Agency in Yugoslavia during 1964-1966 and financed by the United Nations Special Fund (UNSF), a forerunner of UNDP. There has been considerable follow-up assistance financed by UNDP, which continues to support some of the activities aided by UNSF in the past. As a result of the assistance rendered, the Institute for the Application of Nuclear Energy in Agriculture, Veterinary Medicine and Forestry (INEP) was established at Zemun near Belgrade; it is now a widely recognized centre and serves as a national focal point for nuclear-aided research in certain fields of agricultural science. INEP has also served as host for a number of national, regional and interregional training courses supported by the Government, the Agency, or SIDA, or by a combination of the three, and is perhaps best known for its development of radiation-attenuated vaccines for sheep and goat lungworm.

35. The second of the large-scale-assistance projects in agriculture executed by the Agency was started in India in 1968. In this country, numerous state and federal universities as well as national and regional research institutes are devoted to research and training to improve agricultural productivity. In addition, the federal Department of Atomic Energy carries out a substantial research programme in food and agriculture. It was decided to concentrate UNDP aid for the development and use of nuclear technology in agriculture to avoid unnecessary duplication of equipment and effort, and to make more effective use of development aid. Accordingly, with UNDP assistance, facilities for the application of nuclear techniques were strengthened at four research institutes. The major portion of UNDP's assistance was provided to the Indian Agricultural Research Institute (IARI), New Delhi, where a Nuclear Research Laboratory (NRL) was established, equipped and staffed on the IARI campus. The NRL, inaugurated in 1971 and now in full operation, is a national facility designated to serve the IARI and other agricultural research institutes in respect of research involving numerous uses of nuclear and other advanced technology. The NRL has so far been primarily concerned with nuclear applications in soil science and plant breeding, as well as with the analysis of the oil and the protein content of seeds. Substantial aid was also provided to the Agricultural Division of the Bhabha Atomic Research Centre in Trombay, mainly for work in entomology, plant breeding and soil fertility studies carried out in co-operation with other federally-operated agricultural research institutes. The other two institutes which received UNDP assistance to improve their capability, through the introduction of nuclear techniques, were the National Dairy Research Institute (NDRI), Karnal, and the Indian Veterinary Research Institute (IVRI), Izatnagar. Whereas NDRI has concentrated on the use of isotopes in various physiological

and nutritional studies relevant to dairy production, IVRI has emphasized development work to exploit the radiation-vaccine technique and to use isotopes in carrying out research to develop more economical methods of livestock nutrition based on the utilization of non-protein sources of nitrogen (for example, urea mixed together with molasses and straw) instead of expensive imported animal feeds. As a result of the project work, the Government of the State of Jammu and Kashmir has constructed a facility near Srinagar in the Himalayan foothills to mass-produce radiation vaccines to inoculate sheep in the vicinity for lungworm. Large-scale field experiments have shown a difference in weight-gain of almost 3 kilograms between inoculated and non-inoculated five-month-old lambs. Also, the animal diet based on the urea and molasses mixture developed at IVRI was used extensively and successfully in emergency operations to save cattle from starvation in drought-stricken areas in the State of Maharashtra. The institutes participating in the project have already served as hosts for national, regional and interregional training courses, seminars and other scientific meetings. Negotiations were concluded in 1977 for SIDA-funded, large-scale follow-up assistance to these same four institutes, to commence in 1978.

36. The third example of large-scale UNDP assistance provided through the Agency to an agricultural project has been in Brazil. This five-year project, initiated in 1972, aims at the improvement of agricultural production through the application of nuclear technology at the Centro de Energía Nuclear na Agricultura (CENA) and is jointly sponsored by the National Atomic Energy Commission and the Escola Superior de Agricultura "Luiz de Queiroz" of the University of the State of São Paulo at Piracicaba. The project's work plan places equal emphasis on training and research in a variety of subjects, including soil fertility, plant nutrition, plant disease, insect control, plant breeding, as well as animal nutrition and health. The project is designed to strengthen existing facilities at CENA so that it can serve as the main centre for nuclear-aided research in agriculture for the country. Soil-plant-science activities under the project have concentrated on improving the production of beans (*Phaseolus vulgaris*), which constitute the most important high-protein source for the Brazilian population. The work at CENA is linked with the national bean project (EMBRAPA) of the Ministry of Agriculture, thereby ensuring full collaboration with agricultural research institutes and universities in other parts of Brazil.

37. The fourth project of this kind is the SIDA-assisted five-year project in Bangladesh, which started in 1974. The project is being conducted at the Institute of Nuclear Agriculture (INA) on the campus of the Bangladesh Agricultural University in Mymensingh. As with the previously mentioned projects, equal emphasis is being placed on training and research, the long-range objective being to improve agricultural production through better and intensified plant breeding, the optimal use of fertilizers, efficient control of plant diseases and pests and the judicious use of groundwater resources for crop irrigation. This objective is compatible with the Government's aim to increase agricultural yields through the utilization of more efficient techniques and the specialized training of personnel. The project's primary goals are the planning and implementation of problem-oriented, interinstitutional-integrated research and the strengthening of INA's training and research facilities. Arrangements have already been made to ensure co-operation with other agricultural research institutes and extension organizations in the country.

38. The large-scale assistance projects mentioned above were designed to help meet the needs of countries that have a history of active agricultural research and a rapidly developing agricultural industry. Of similar importance, however, are the many decentralized agricultural projects, although they receive only relatively small amounts of Agency assistance. These activities are highlighted below, by subject.

39. Soil fertility, irrigation and crop production research projects involving the application of isotope and radiation techniques were assisted in Bulgaria, Colombia, Chile, Greece, Ivory Coast, Kenya, Republic of Korea, Malaysia, Morocco, Pakistan, Peru, Senegal, Sri Lanka, Syria, Thailand, Tanzania and Uruguay. The Agency provided expert services, training and equipment to supplement the recipient countries' efforts. Major accomplishments during the period under review include the establishment of radioisotope laboratories



in Peru and Tanzania; the evaluation of the optimum source, rate, method and time of application of nitrogenous and phosphatic fertilizers; the development of efficient water management regimes for cereals, grain legumes and plantation crops in a number of Member States in particular, in the Ivory Coast, Republic of Korea, Morocco, Peru, Senegal and Sri Lanka; root activity pattern studies on rice in the Ivory Coast, cocoa trees in Malaysia and rubber trees in Sri Lanka and the assessment of the productivity of different grapevine cultivars in Uruguay. The results are expected to contribute significantly towards increasing crop production and the improvement of the quality of crops in the most economic way in the countries concerned.

40. In the area of mutation plant breeding, three UNDP/IAEA projects should be specifically mentioned. In Burma, promising mutants of local rice varieties and the introduced variety IR5 have been developed; one IR5 mutant has particularly desirable characteristics; in large-scale trials it gave high yield as well as high grain quality and was released as a new variety, named "Shwe War Tun", in 1976. Similarly, successful results have been obtained in jute; an early-maturing, high-yielding mutant was selected and has now been released for commercial use under the name "Shwe Gon Tun". Promising mutants have also been found in groundnut, sugar cane, pulses and cotton which must be further tested before an evaluation of their agronomic value can be made.

41. Early-maturing mutants of the rice variety Pelita I/1 have been produced by gamma radiation in Indonesia. Eleven of the most promising mutants were included in the official testing by the Ministry of Agriculture during the 1976-1977 growing season. The results from the last four successive seasons show the high-yield potential and earliness (120 days) of these mutants; an application has been made for the release of three mutants for planting by farmers. The research programme also includes mutation-breeding work for the improvement of disease and pest resistance, and higher seed-protein content.

42. In Pakistan a plant-breeding project has produced a large number of useful rice mutants of the leading high-yield, introduced IRRI varieties, IR6 and IR8, and of the high-quality local variety, Basmati 370, which is preferred by consumers and constitutes an important export commodity. In respect of Basmati 370, the work has concentrated on the development of early-maturing, short-statured mutants; one early-maturing mutant with high potential was selected and included in large-scale yield trials in the Punjab and Azad Kashmir provinces in 1976 and 1977; this mutant has now been released for practical cultivation in Kashmir under the name "Kashmir Basmati". The improvement of IR6 and IR8 grain quality and shape was of particular interest to make these varieties more acceptable to consumers. In wheat, good progress has been made, through mutation, in improving the resistance of the "Mexipak" variety to rust and in producing short-statured mutants from local wheat varieties.

43. The use of isotopes and radiation has also made considerable impact in projects aimed at improving animal production and health. Isotopes have been mainly used in studies on the efficiency of feed utilization, in particular on the way in which ruminants can make use of non-protein nitrogen added to low-quality roughages and in mineral-deficiency work. To a lesser extent, isotopes have also been used to study the negative effect of parasites on animals and on animal production, and the relationship of certain body hormones to fertility and reproduction; as low reproductive performance is one of the limiting factors to animal production, this latter application is becoming increasingly important. Radiation has been used with notable success in the production of an attenuated vaccine for lungworm parasites in cattle, sheep and goats; radiovaccines have been less successful, however, with other parasitic diseases. The countries which have received assistance for such work are Costa Rica, Cuba, Ethiopia, Iceland, India, Lebanon, Mali, Sudan, Syria, Thailand and Yugoslavia.

44. The radiation sterilization of mass-reared insects and their subsequent release has been demonstrated as a useful technique in the control and eradication of selected pest species. A large programme aimed at preventing the migration of the Mediterranean fruit fly into Mexico and incorporating the use of the sterile-insect-release technique has been initiated jointly by the Governments of Mexico and the United States. The Agency, (i) under

a contract with the USDA-APHIS, is providing sterile flies produced at its Seibersdorf Laboratory for this programme and, (ii) under its regular programme, is assisting Mexico in the design of a mass-rearing facility, as well as by providing experts, training at Seibersdorf and specialized equipment.

45. In 1977, the Agency entered into an agreement with the Government of Nigeria for the implementation of a large-scale project to investigate the advantages, efficacy and economics of the use of the sterile-insect-release technique for the control or eradication of a riverine species of tsetse fly. The Agency will contribute to this project by providing services and research facilities with the financial support of a number of advanced countries. Through a co-operative agreement with the USA, the Agency is also providing supporting laboratory research for a programme in Tanzania which aims at assessing the feasibility of the control or eradication of a savannah species of tsetse fly using the sterile-insect-release technique.

46. Nuclear techniques are powerful and often unique tools in the study of pollution and the development of control measures in the context of food, agriculture and fisheries. Technical assistance to projects in Nigeria and the Sudan provides needed support to studies on the fate of pesticide residues.

47. In the area of food preservation by irradiation, UNDP/IAEA assistance to a project in Cuba is scheduled to commence soon. This project is designed to determine the technological and economic feasibility of food irradiation on a pilot scale, at the Centro Nacional de Investigaciones Científicas (CNIC), Havana.

48. Training is of overriding importance for all these activities. In addition to fellowship awards made for individual study, interregional training courses were held on selected topics in 1977: on the use of nuclear techniques for the study of chemical residue and pollution problems (in Colombo, Sri Lanka), on the use of nuclear techniques in animal production (in Lima, Peru), on the use of isotopes and radiation in entomology with special reference to pest management and the sterile-insect-release technique (in Gainesville, Florida), on the application of nuclear techniques in agriculture (in Moscow, Soviet Union) and on plant breeding for disease resistance, including the use of induced-mutation techniques (in New Delhi, India).

## B. OTHER DEVELOPMENTS

### 1. UNDP's financial situation

49. The UNDP programme executed by the Agency during 1977 still reflected the difficult financial situation that arose in UNDP late in 1975. As mentioned in last year's report[6], no new large-scale activities in the Agency's field of competence were initiated in 1976, with the result that the volume of UNDP assistance provided in 1977 decreased from \$3 million to \$2.1 million. While a number of the measures introduced by UNDP such as annual country expenditure ceilings will remain in effect, UNDP's financial situation has now become normalized; accordingly, it is felt that the decline in the UNDP assistance provided through the Agency reached "bottom" in 1977, and this trend will now be reversed. The decrease in UNDP expenditures during 1977 was somewhat more pronounced than during 1976, amounting to 28.6% as compared with 23.8% in the previous year. Although the distinction between large- and small-scale assistance is no longer maintained in UNDP, it was observed that the decrease in UNDP expenditures in 1977 was due more to a reduction in small-scale assistance expenditures (25 active projects) than to lower large-scale assistance expenditures (18 active projects).

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[6] GC(XXI)/INF/169, paragraph 38.

50. Indicative of the fact that the UNDP-financed programme being executed by the Agency is "on the road to recovery" is the approval in 1977 of eight new projects for which UNDP funds totalling \$6 127 000 are foreseen. This is the sum of the annual increments of assistance that will be provided, commencing in 1978, during the lifetime of these projects. In addition, proposals for the provision of sizable additional amounts of UNDP assistance, through the Agency, to a number of new projects are being discussed with Governments and UNDP.

51. The Agency's activities on behalf of UNDP follow exactly the global pattern observed in respect of UNDP activities as a whole. The decision taken in 1975 to cut back UNDP assistance beginning in 1976 inevitably also affected the volume of the UNDP-funded assistance provided in 1977 by all the agencies in the United Nations system; this had been anticipated by the Administrator of UNDP, who realized that time would be needed for the programme to regain momentum. Just as in 1976 the recipient Governments had to decide where reductions in UNDP assistance had to be made, to stay within the expenditure ceilings introduced by UNDP, in the same way in 1977 Governments had to reassess their priorities once UNDP's financial position improved. Consequently, the level of UNDP-assistance approvals caused some concern early in 1977 because country requests were coming in at a relatively slow rate. The financial level of such approvals rose sharply throughout the world during the last half of 1977, so that UNDP is once more in the position to encourage the full implementation of approved assistance by executing agencies in 1978.

## 2. Co-ordination of technical assistance matters with UNDP

52. The desirability of co-ordinating, wherever possible, the Agency's technical assistance activities with other assistance programmes at the country level has been widely recognized. In its contacts with Member States on the subject of the programming of technical assistance, the Agency increasingly emphasizes this point. Although the co-ordination of external aid is, first and foremost, a task and a prerogative of the recipient Governments themselves, the agencies in the United Nations system also wish to ensure that the duplication of assistance does not occur. Accordingly, for these agencies the world-wide network of UNDP resident representatives offers valuable focal points in the developing countries for the continuous exchange of information relating to bilateral- and multilateral-assisted technical co-operation programmes, as well as on project follow-up and other matters. This valuable source of information is of particular importance to the Agency, as it does not have outposted field representatives of its own.

53. In countries where the Agency provides UNDP-financed assistance, the need for continuous contact with the UNDP resident representative's office is obvious. It should be mentioned that the Agency also receives considerable help from UNDP resident representatives in implementing regular programme and SIDA-financed technical assistance, for example, in clearing shipments of equipment through customs, making subsistence payments to experts and procuring airline tickets for holders of fellowship awards.

54. Irrespective of whether the Agency is executing UNDP assistance in a country or not, close contact is maintained with the UNDP resident representative. Agency staff members on mission, especially if the mission entails technical assistance programming or project formulation elements, give the local UNDP office advance notice of their visit as a matter of course, irrespective of the source of financing contemplated for any projects in question. Briefing discussions, which usually take place both at the beginning and the end of such visits, provide the Agency with a more thorough knowledge of the development objectives and activities in a particular country, while keeping the UNDP resident representative informed of recent developments in the Agency's sphere of competence.

55. Due to limitations in staff and travel funds, only about 30% of the countries receiving assistance from the Agency can be visited in any given year. Visits by UNDP resident representatives to the Agency's Headquarters therefore constitute another important opportunity for programme co-ordination. UNDP resident representatives customarily

make briefing visits to the headquarters of all agencies on commencing their assignments and on the completion of their posting in a given country. Some UNDP resident representatives also visit Europe-based agencies in conjunction with home-leave travel. The presence of UNIDO Headquarters in Vienna ensures that Vienna is always included in the itinerary of UNDP resident representatives since UNIDO executes a considerable portion of UNDP-financed technical assistance. This affords the Agency the opportunity to meet all UNDP resident representatives, even in cases where a separate stopover of a UNDP resident representative would not have been warranted on the basis of the volume of the Agency's activities on behalf of UNDP in his country of assignment. The UNDP Office in Geneva informs both the Agency and UNIDO of all such visits, which are then co-ordinated by the two agencies in Vienna.

56. UNDP organizes inter-agency meetings at the executive head, upper management and middle management levels on various topics concerning the programming, administrative and implementation aspects of the assistance approved under that programme. Owing to the steady increase in the number of inter-agency meetings of this kind, as well as to the constraints in manpower and travel resources, it is not possible for the Agency to be represented at each of these meetings, even if its participation would be relevant. However, care is taken to ensure Agency participation in a selected number of UNDP-organized inter-agency meetings and activities that are essential to the operation of the Agency's UNDP programme and which provide the opportunity for consultation with UNDP and the other agencies on matters of common concern.

### 3. Technical co-operation among developing countries

57. The concept of "technical co-operation among developing countries" (TCDC) is receiving increasing attention in the forums of the United Nations system. In resolution 3251(XXIX) of 4 December 1974, the General Assembly of the United Nations endorsed the report of the Working Group on TCDC and requested the Administrator of UNDP, the participating and executing agencies in the United Nations Development System and the regional economic commissions to take appropriate steps to ensure its implementation. The report of the Working Group on TCDC, as amended by the Governing Council of UNDP at its twenty-third and twenty-fourth sessions, constitutes the basic document in which the role to be played by the United Nations Development System in TCDC is defined.

58. In preparation for the United Nations Conference on TCDC to be held in August 1978 (for which the Administrator of UNDP will serve as the Secretary General), UNDP - in co-operation with the regional economic commissions - organized four regional intergovernmental meetings on TCDC at which some of the recommendations included in the report of the Working Group on TCDC were further elaborated. The concept of TCDC has been modified somewhat as a result of these discussions and, although no precise definition has been formulated, TCDC is now viewed as a dynamic international movement initiated primarily in response to the developing world's resoluteness to achieve national as well as collective self-reliance and to bring about a new international economic order. One of the basic objectives of TCDC is the enhancement of the creative capacity of the recipient countries to attain development objectives in a manner consistent with their own system of values and special needs. In essence, TCDC involves the sharing of technical resources, skills and capacities among developing countries for their mutual benefit and development.

59. Although the Agency was not able to participate in the regional meetings on TCDC, it did report on those Agency activities which contain elements of TCDC, is participating in the relevant inter-agency discussions, and is offering comments on various working papers circulated to United Nations agencies on the pertinent issues. The detailed reporting requested from all United Nations agencies on their TCDC activities, as a follow-up to General Assembly resolution 3251(XXIX), is required to document the progress being made by the United Nations system in replacing the existing "north-south" flow of traditional technical assistance with a "south-south" stream of technical co-operation. Particular importance is attached to assistance projects which, although financed from multilateral

funds, rely almost entirely upon the resources and experience of the developing countries and on the evolution of indigenous strategies and solutions, for their execution.

60. While fields in which TCDC offers unique advantages can readily be identified, the specific nature of the Agency's sphere of competence poses certain constraints to early and full compliance with all the recommendations on TCDC approved so far by the General Assembly. It is obvious that, since all technical assistance provided by the Agency is based on requests from its Member States, responding to those requests by providing the assistance when it is needed must indeed remain the major concern of the Agency.

61. The Agency specializes in areas which involve the application of the most advanced techniques in conducting basic and applied research, calling not only for a very high level of scientific and technological expertise, but also for the use of very elaborate, sophisticated instrumentation. The main sources of expertise, equipment and training facilities are still concentrated in those countries where nuclear technology was developed, and the existing uneven distribution of such resources forms a practical impediment to placing major emphasis on TCDC in much of the Agency's work. TCDC activities within the Agency's sphere of competence can automatically increase in step with the achievement of a more equal distribution of nuclear "know-how" and technology. The present technical assistance programmes, even if still reflecting a dominant "north-south" flow, are in themselves contributing to redress the imbalance. Those countries in the developing world that have already attained a high level of proficiency in the Agency's sphere of competence are of course fully involved in the Agency's overall technical co-operation efforts; the contribution which such countries make is highly valued, and every effort is being made to increase their involvement.

62. The use of nuclear techniques - which rely on measurements made by electronic instruments that often have to be protected from dust, heat and excess humidity to ensure the reliability of the results and guarantee reasonably long service - follows the same pattern throughout the world. Many of the adaptations possible in the developing countries in the nuclear area involve the selection of less sophisticated equipment; the advantages gained thereby are smaller capital outlays and fewer maintenance problems. Such reduced-scale instruments usually suffice when the number of measurements or analyses to be made is relatively low. It is in this latter area that TCDC can be especially beneficial. On the other hand, the techniques in which the Agency is asked to provide training are less suited to local adaptation than, for instance, those used in rural development or teacher training. In many of its projects it is indeed incumbent upon the Agency to ensure that, in spite of the local conditions, research work making use of nuclear technology is conducted in compliance with the stringent and mandatory safety standards and codes required by the very nature of the techniques the Agency helps to introduce. Within this framework the Agency fully endorses TCDC as an integral and vital part of the global technical co-operation effort.

## Part II. ANALYSIS OF THE ASSISTANCE PROVIDED

### A. AVAILABLE RESOURCES

#### 1. General

63. The resources available to the Agency in 1977 for the provision of technical assistance came to \$11 586 000 (see Figure 1 and Table 1), which is 6.6% higher than the figure for 1976 (\$10 872 000) and is made up as follows:

- (a) UNDP, \$2 144 400 in cash: \$262 700 for small-scale projects and \$1 881 700 for large-scale projects;
- (b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, \$5 866 000;
- (c) Extrabudgetary funds, \$1 944 000, for the provision of expert services, equipment and fellowship training; and
- (d) Gifts in kind (services of cost-free and partly cost-free experts and lecturers, grants of equipment in support of approved technical assistance projects, Type II fellowships and funds to defray the expenses of scientific visitors) valued at \$1 632 000.

#### 2. UNDP

64. To the total of \$2 144 400 spent by the Agency to carry out the UNDP field programme in 1977 (\$22 000 for assistance to intercountry projects and \$2 124 400 for assistance to country programme - including large-scale - projects) \$691 900, the unliquidated obligations carried forward to 1978 (the comparable figure a year ago was \$765 700), should be added to give a clearer picture of the total UNDP resources at the Agency's disposal in 1977.

65. Cost sharing: The UNDP cash resources shown above (and in Figure 1 and Table 1) include \$79 057 made available by the Government of Turkey under cost-sharing arrangements in respect of assistance provided through the Agency in 1977.

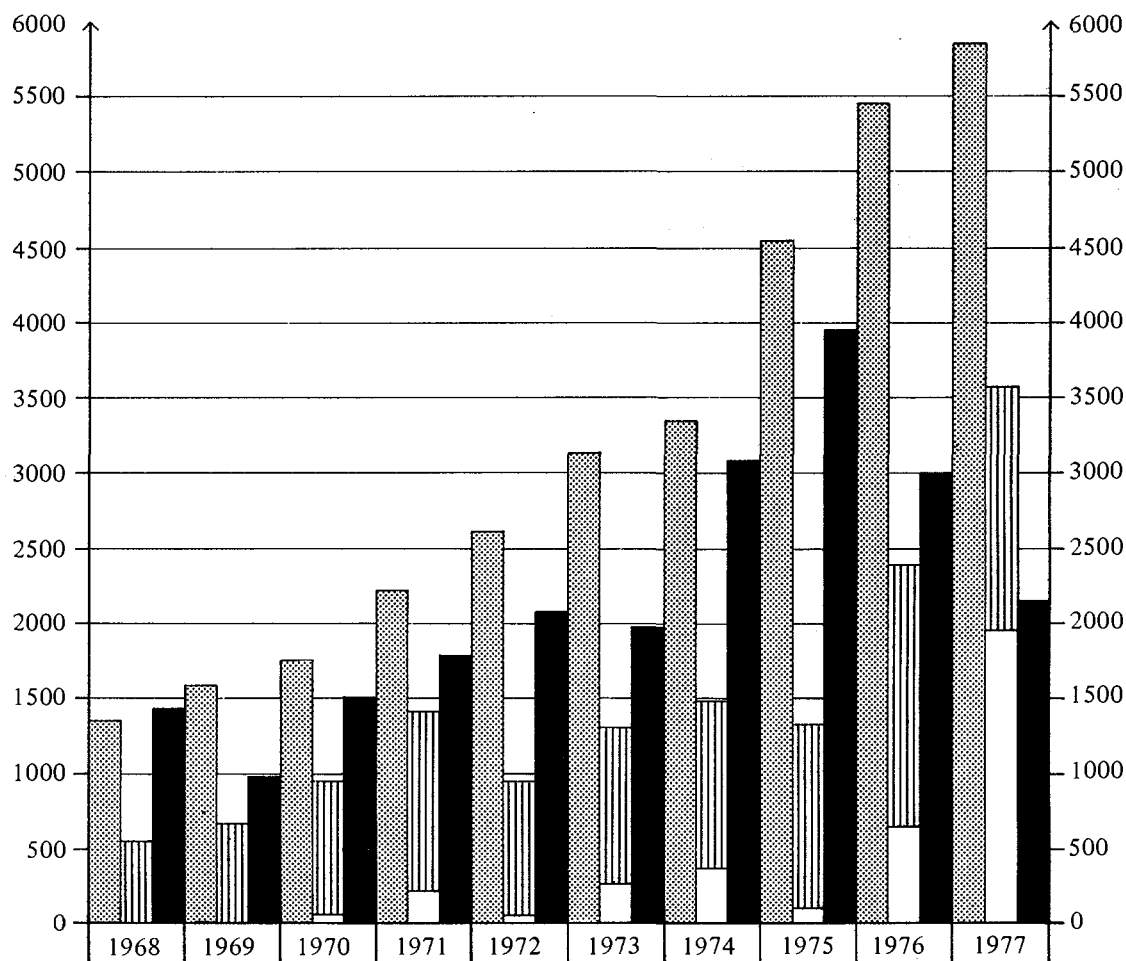
#### 3. Agency's regular programme

66. As at 31 December 1977, the pledges of voluntary contributions to the General Fund for 1977 had reached 88.9% of the target figure of \$6 million, the largest amount pledged in any year to date, as compared with 92% of the \$5.5 million target figure in respect of 1976. Member States' pledges (\$5 334 600, as compared with \$5 062 000 for 1976) were reflected in the income to Operating Fund II (totalling \$5 866 000 from all sources in respect of 1977, as compared with \$5 474 000 for 1976) from which the regular programme is financed. Additional information is given in Annex V.

#### 4. Extrabudgetary funds

67. As can be seen in paragraph 63(c), extrabudgetary funds totalling \$1 944 000 were made available in 1977, as compared with \$661 000 in 1976, for the provision of technical assistance. Since 1962, when the Government of the USSR first made a special cash contribution to the Agency to finance the training of fellows in the Soviet Union, modest amounts of extrabudgetary funds have been made available to the Agency for the provision of technical assistance in certain subjects or for specific projects, as agreed with the donors.

**FIGURE 1**  
**RESOURCES AVAILABLE FOR**  
**AGENCY TECHNICAL ASSISTANCE PROGRAMMES: 1968-1977**  
(in thousands of dollars)



Agency funds	1348	1586	1749	2224	2636	3124	3348	4540	5474	5866
Extrabudgetary funds	—	13	61	218	60	267	369	108	661	1944
Assistance in kind	565	658	894	1197	900	1032	1114	1212	1735	1632
UNDP funds	1422	981	1513	1775	2072	1964	3082	3941	3002	2144
<b>TOTAL</b>	<b>3335</b>	<b>3238</b>	<b>4217</b>	<b>5414</b>	<b>5668</b>	<b>6387</b>	<b>7913</b>	<b>9801</b>	<b>10872</b>	<b>11586</b>

Agency funds
 Extrabudgetary funds
 Assistance in kind
 UNDP funds

In the past, the assistance financed from these funds was included in the totals for assistance provided in kind, due to the relatively low volume involved. The receipt in 1977 of special cash contributions of about \$100 000 from the Government of Canada, \$620 000 from the Government of Sweden and \$1.2 million from the Government of the United States of America made it desirable to include a separate category in this report so that a more accurate accounting could be made of such funds. Additional information is given in Tables 1, 4, 5B, 7 and 8, as well as in Annex II.A.

#### 5. Gifts in kind

68. The estimated value of the assistance in kind made available for 1977 programmes was \$1 631 700, which is about 6% lower than the figure of \$1 734 800 for 1976. The lower sum in respect of 1977 is due mainly to the fact that instead of making the customary number of equipment grants the United States of America made a special cash contribution of \$1 157 000 to assist a number of projects under the Agency's 1977 regular programme.

69. This resulted in a sizable decrease in the amount available from all sources for equipment (from \$483 100 to \$75 800) and a nominal reduction in the amount for cost- and partly cost-free expert services (from \$117 700 to \$82 400). There was, however, an offsetting increase in the resources made available for training (from \$1 134 000 to \$1 473 500, consisting of Type II fellowship stipends and funds for scientific visitors).[7] Some equipment grants were provided as assistance in kind by the United States of America in 1977 (see Annex II.C).

70. Host country contributions: The assistance provided by the Agency often involves a much larger financial commitment on the part of the recipient countries; as this is in their own interest, it is understandable that the value of the counterpart staff and facilities made available by Governments is not reflected in the financial statistics in this report. The value represented by the lecturers and other facilities made available by a Government that hosts a regional or interregional training project (see Annex III) is also not reflected herein. In this connection, credit is due to France, the Federal Republic of Germany and the United States of America for the valuable assistance they rendered in preparing and carrying out the training courses relating to nuclear power projects which were held in 1977.

#### 6. Funds in trust

71. Assistance valued at \$35 700 was provided by the Agency under funds-in-trust arrangements with two developing countries in 1977 (see Annex II.B).

#### 7. Use of resources

72. The total value of the technical assistance being provided by the Agency exceeded the \$15.3 million mark for the first time in 1977 (the figure for 1976 was \$13.7 million) and consisted of \$9 018 000 in assistance provided and \$6 356 200 in unliquidated obligations and assistance in kind in the process of being provided but still outstanding at the end of the year. More assistance was provided by the Agency in 1977, that is \$673 400 or 8% more than in 1976. The breakdown of the total of unliquidated obligations and assistance in kind outstanding at 31 December 1977 is as follows: \$741 000 for expert services, \$2 651 600 for equipment and supplies and \$2 963 600 for fellowships.

73. As in earlier years, regular programme expenditures and unliquidated obligations at the end of 1977 exceeded the cash resources in respect of that year's regular programme,

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[7] Additional information is given in Annex V in respect of Type II fellowships made available to the Agency.



due to the fact that the former totals also include expenditures and obligations met from funds carried over in respect of assistance being provided under the regular programme for 1976 and prior years. The type and estimated value of the assistance in kind made available to the Agency in 1977 is given - by donor - in Annex II, which also includes information on assistance to projects included in the 1977 regular programme which was financed from special cash contributions.

## B. DISTRIBUTION OF ASSISTANCE

### 1. By field of activity

74. A 1976:1977 comparison is given below of the amount of assistance provided in what were the top five fields of activity in 1977. Numerical data for all ten fields of activity are given in Figures 2A, 3A and 4A (which also include comparable data for 1976) and in Figure 5A.

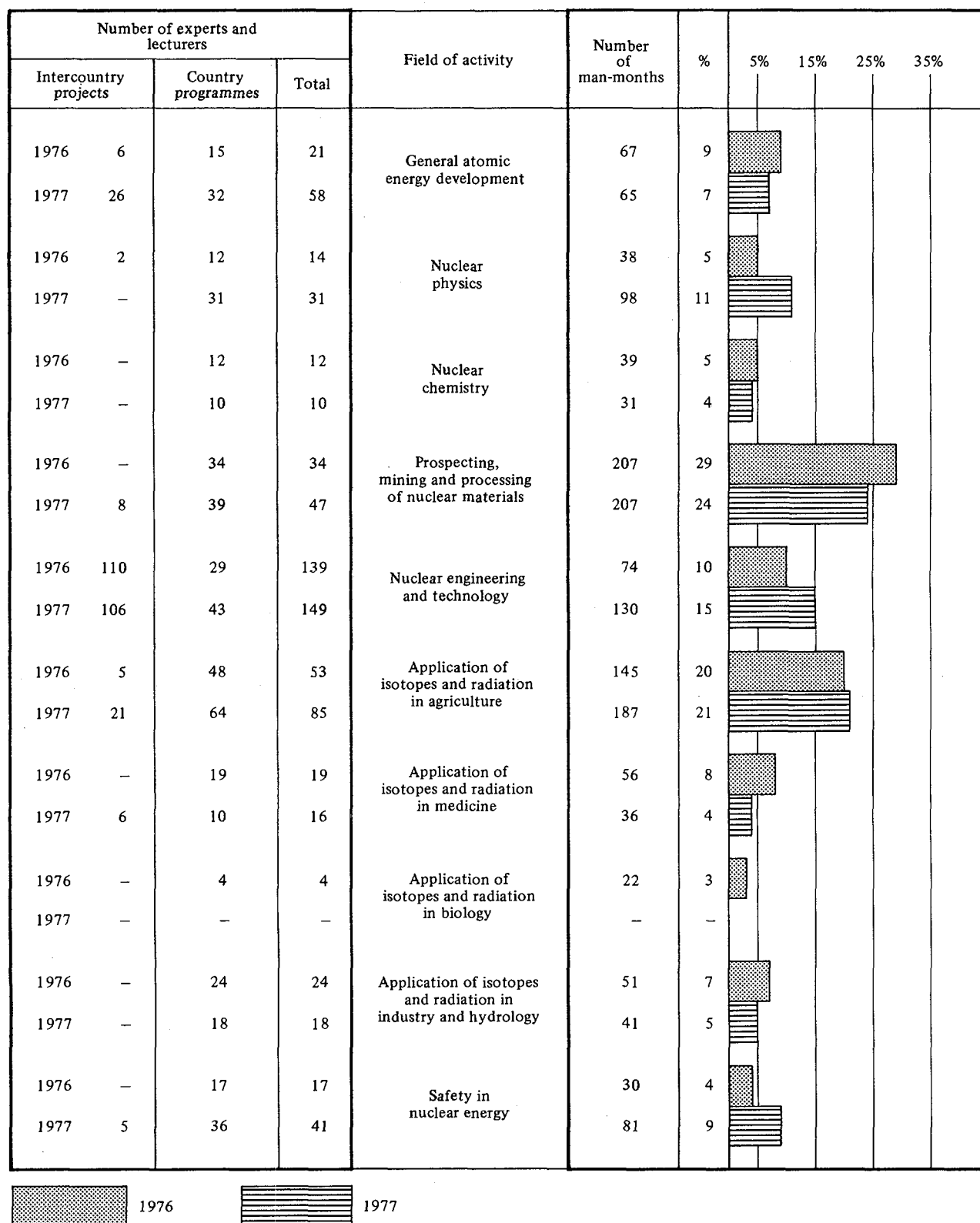
Assistance by field of activity and type: 1976 and 1977  
(in thousands of dollars)

Field of activity	Year	Experts	Equip- ment	Fellow- ships	Share of total programme	
		\$	\$	\$	\$	%
Nuclear engineering and technology	1976	436.4	304.6	792.8	1533.8	18.4
	1977	508.2	573.1	891.4	1972.7	21.9
Application of isotopes and radiation in agriculture	1976	541.9	626.8	520.1	1688.8	20.3
	1977	727.5	525.9	529.0	1782.4	19.8
Prospecting, mining and processing of nuclear materials	1976	836.5	365.7	127.2	1329.4	15.9
	1977	696.0	239.2	155.7	1090.9	12.1
Nuclear physics	1976	131.4	192.6	291.1	615.1	7.4
	1977	313.2	250.9	194.5	758.6	8.4
Application of isotopes and radiation in industry and hydrology	1976	181.5	619.6	91.0	892.1	10.7
	1977	173.3	525.6	52.2	751.1	8.3
Total	1976	2127.7	2109.3	1822.2	6059.2	72.7
	1977	2418.2	2114.7	1822.8	6355.7	70.5
Total assistance	1976	2878.9	2910.7	2547.7	8337.3	100.0
	1977	3265.4	3048.7	2703.9	9018.0	100.0

### 2. By region and country

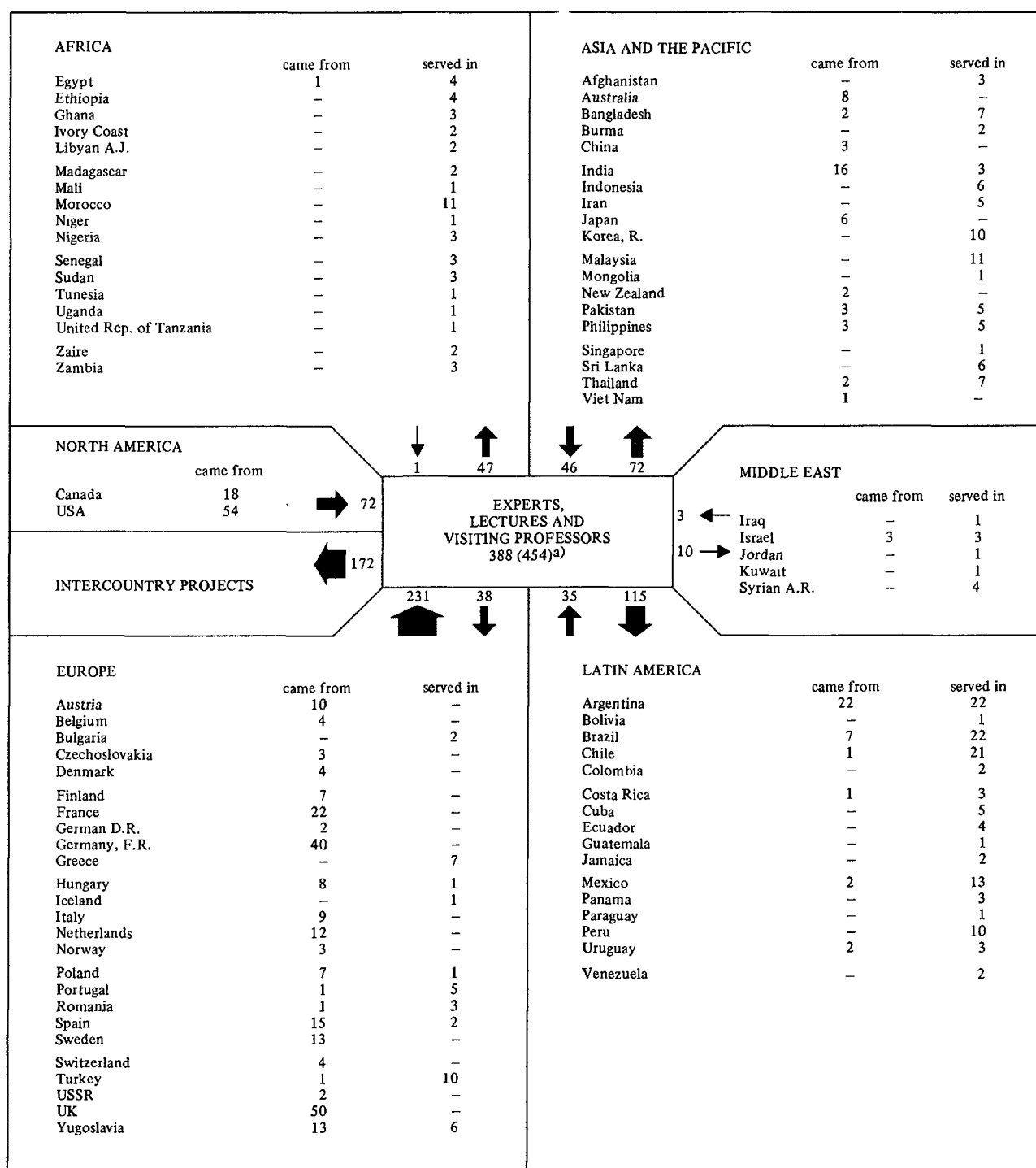
75. Information on the distribution of technical assistance by region is summarized in Figures 5A and 5B. As in each of the years 1970-1977, more countries in Africa - namely, 21 - received Agency assistance than in any other region; 17 States in Latin

**FIGURE 2A**  
**DISTRIBUTION OF EXPERT SERVICES BY FIELD OF ACTIVITY: 1976 and 1977**



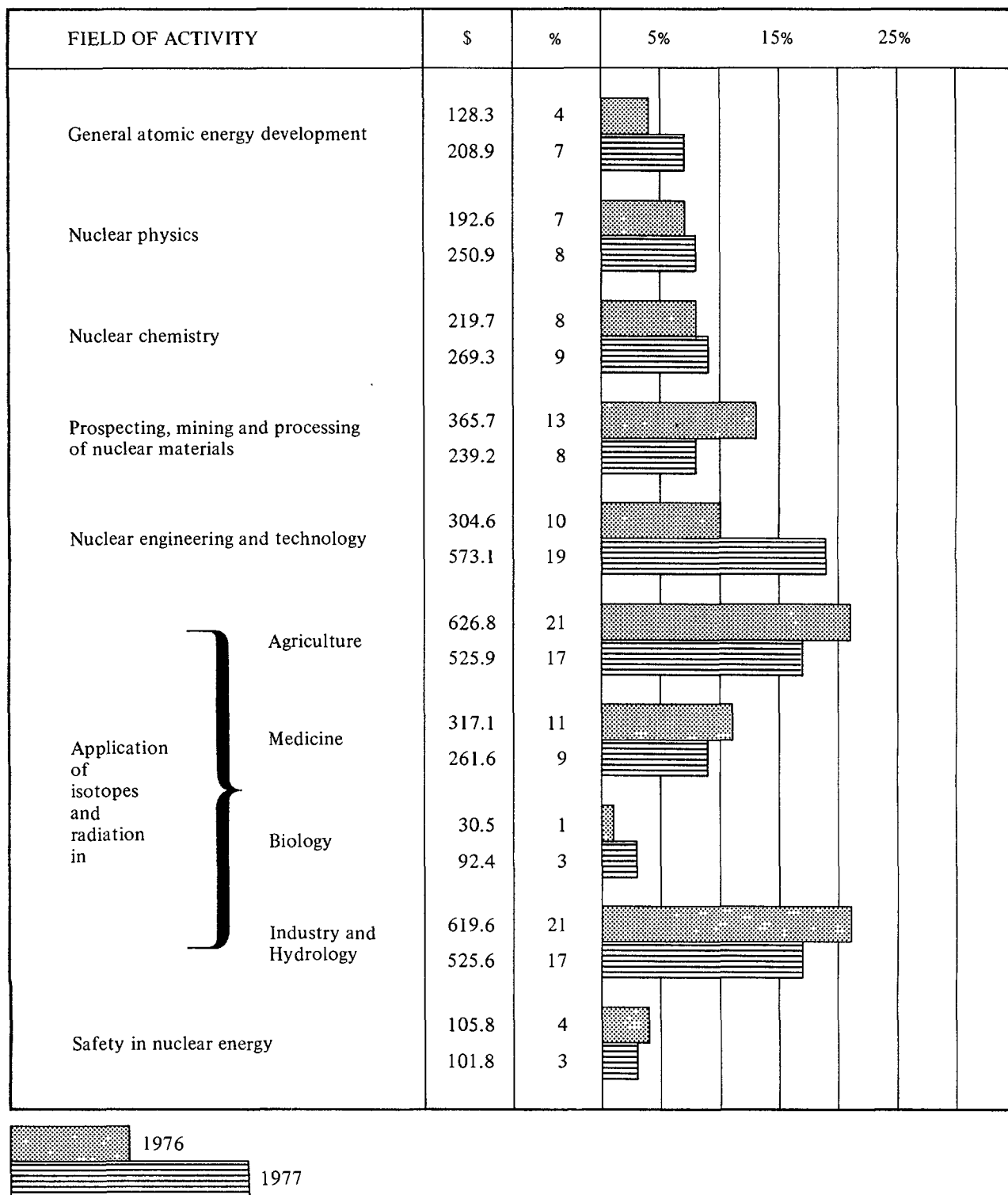
Note: The figures in the columns above, on the right-hand side, indicate the number of man-months and the corresponding percentage share, by field of activity, of the total man-months of expert services provided.

**FIGURE 2B**  
**DISTRIBUTION OF EXPERT SERVICES BY REGION: 1977**



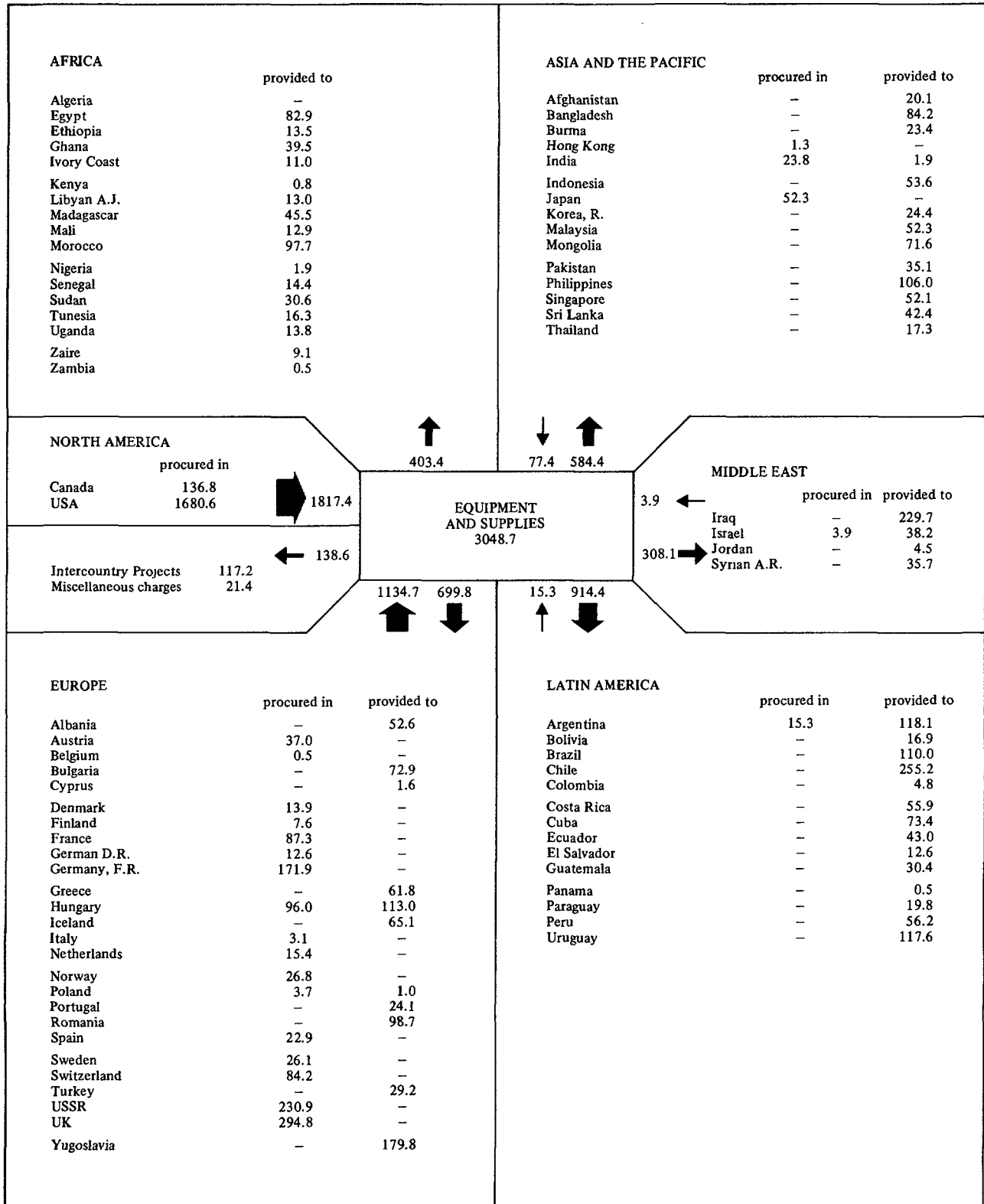
a) The difference between the number of assignments (454) and the actual number of experts (388) is due to the fact that a number of experts served in more than one country.

**FIGURE 3A**  
**DISTRIBUTION OF EQUIPMENT BY FIELD OF ACTIVITY: 1976 and 1977**  
(in thousands of dollars)

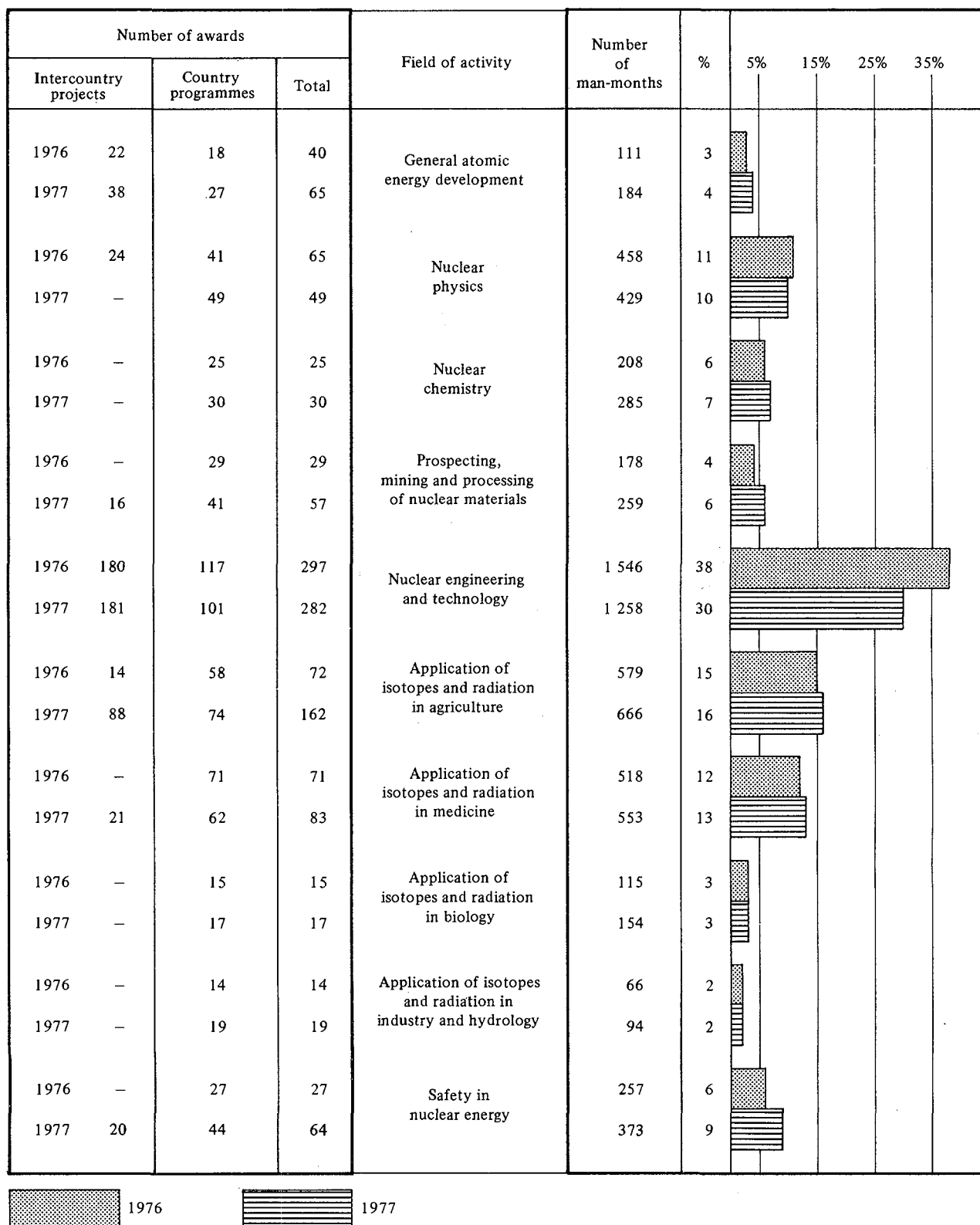


Note: The figures in the second and third columns of the chart indicate the value (in thousands of dollars) of equipment and the corresponding percentage share, by field of activity, of the total equipment provided.

**FIGURE 3B**  
**DISTRIBUTION OF EQUIPMENT BY REGION: 1977**  
(in thousands of dollars)

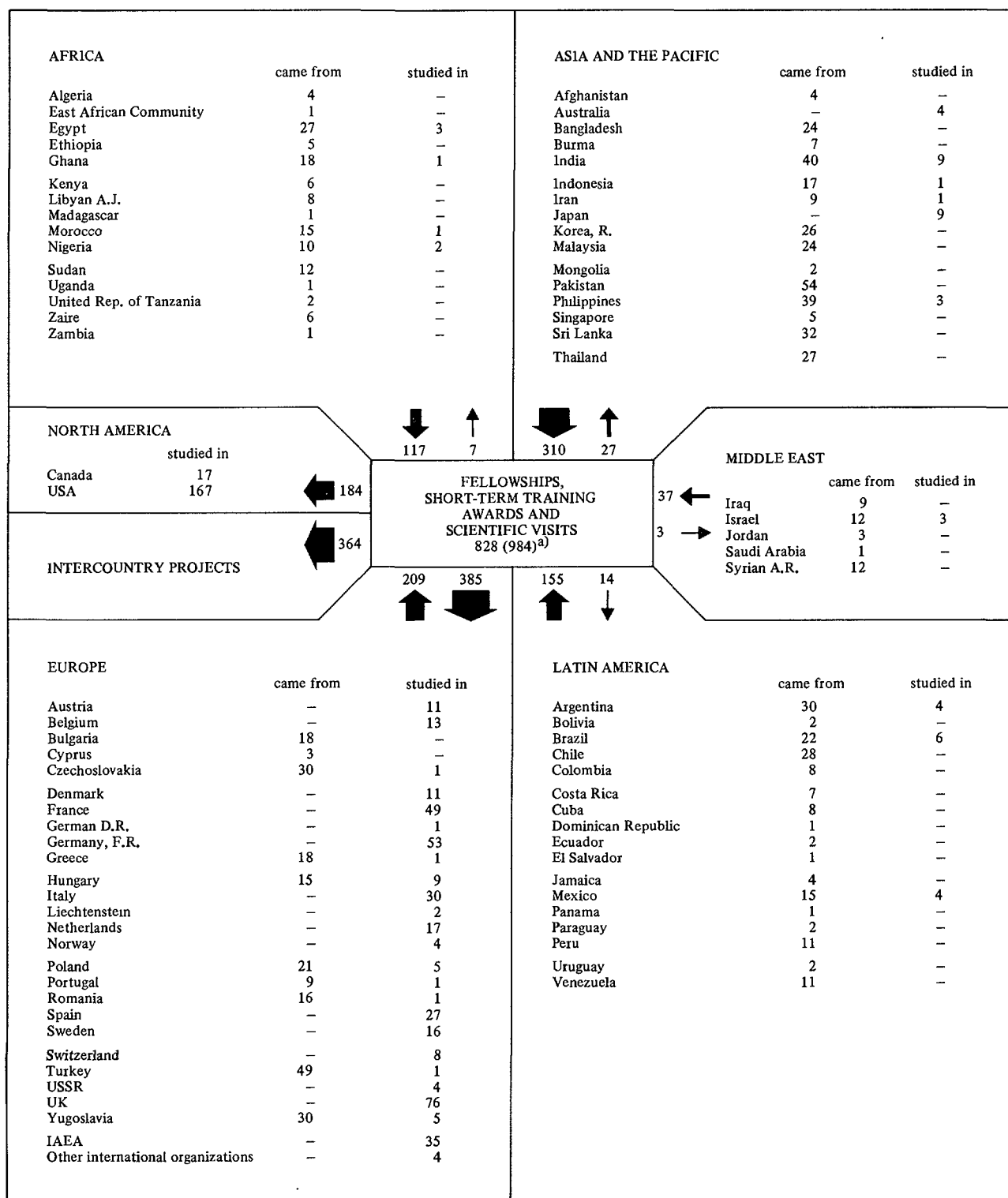


**FIGURE 4A**  
**DISTRIBUTION OF FELLOWSHIP AWARDS BY FIELD OF ACTIVITY: 1976 and 1977**



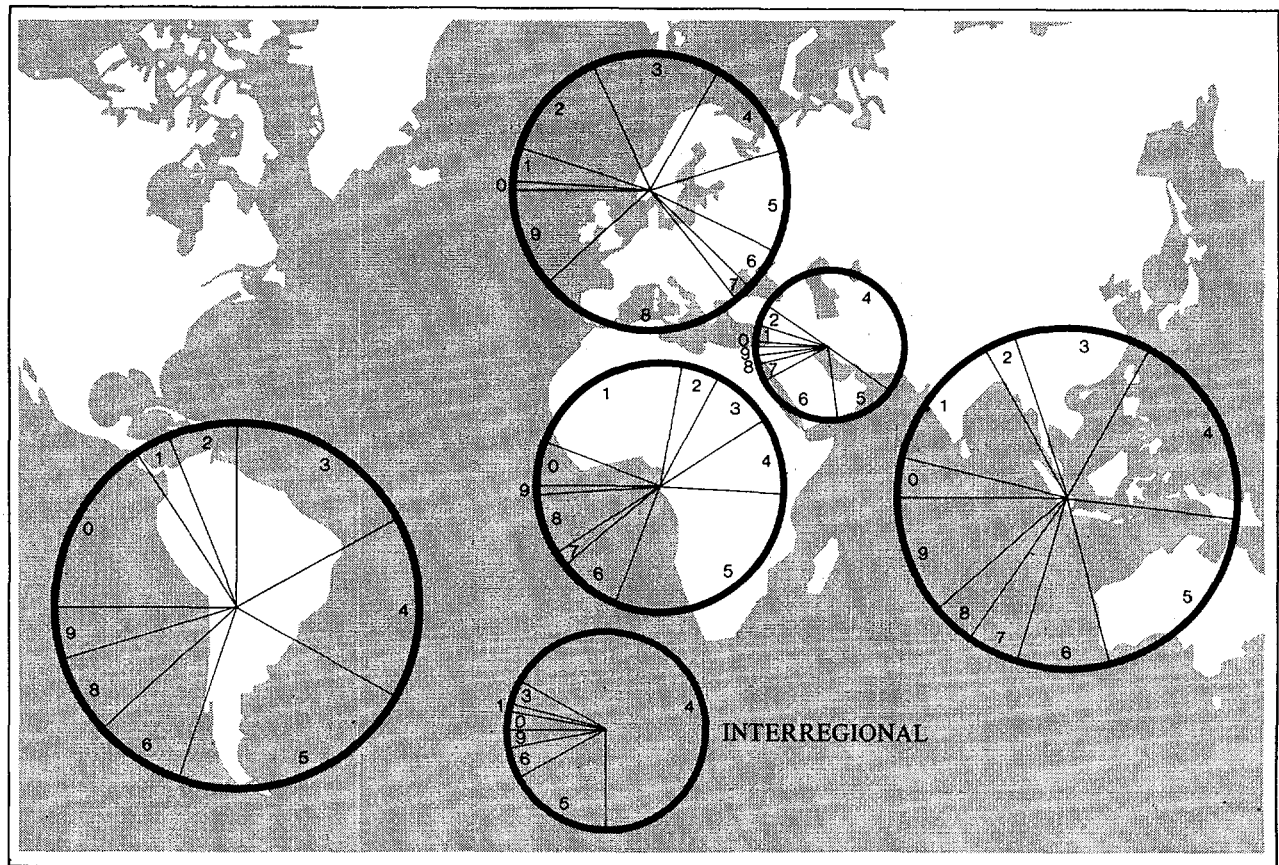
Note: The figures in the columns above, on the right-hand side, indicate the number of man-months and the corresponding percentage share, by field of activity, of the total man-months of fellowships awarded.

**FIGURE 4B**  
**DISTRIBUTION OF FELLOWSHIP AWARDS BY REGION: 1977**



a) The difference between the number of awards (828) and the number of places of study (984) is due to the fact that a number of fellows, study tour participants and holders of awards for scientific visits went to more than one place of study.

**FIGURE 5A**  
**DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD AND REGION: 1977 <sup>a/</sup>**



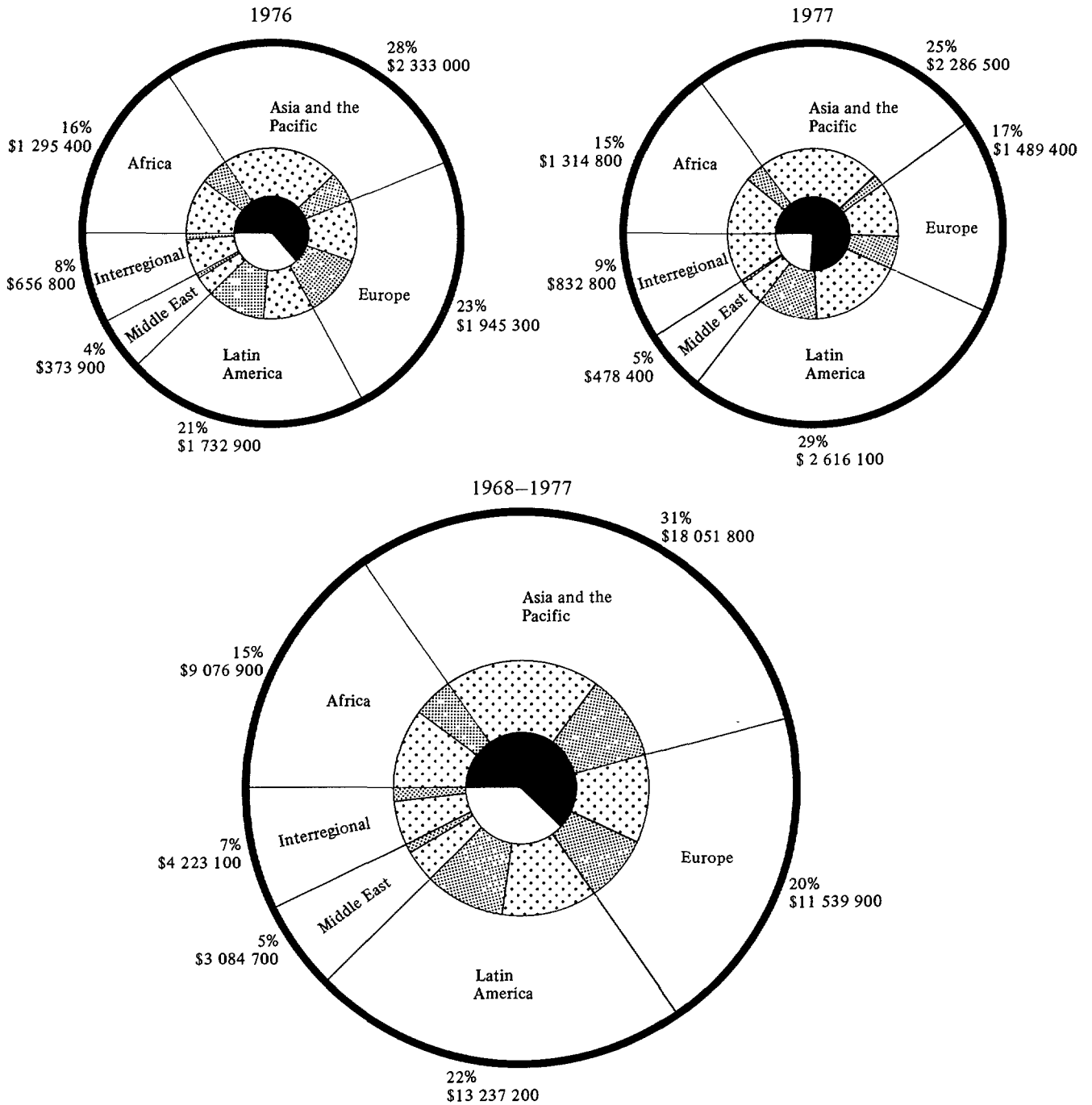
**SUMMARY**

Field of activity	Africa %	Asia and the Pacific %	Europe %	Latin America %	Middle East %	Inter- regional %	All regions %
0 - General atomic energy development	6	4	1	16	1	3	7
1 - Nuclear physics	22	13	4	3	4	1	8
2 - Nuclear chemistry	5	3	13	6	4	—	6
3 - Prospecting, mining and processing of nuclear materials	8	13	15	17	—	4	12
4 - Nuclear engineering and technology	10	19	12	16	51	67	22
Application of isotopes and radiation in	5 - Agriculture	30	19	12	22	13	20
	6 - Medicine	8	9	5	8	19	8
	7 - Biology	2	5	2	—	4	2
	8 - Industry and Hydrology	8	4	24	7	2	8
9 - Safety in nuclear energy	1	11	12	5	2	3	7
	100%	100%	100%	100%	100%	100%	100%

<sup>a/</sup> For each region, the relative monetary value of the technical assistance provided by the Agency is denoted by the size of the circle superimposed over the region on the map. The size of the segments in each circle indicates the share of total assistance given in the various fields of activity.



**FIGURE 5 B**  
**DISTRIBUTION OF TECHNICAL ASSISTANCE BY REGION AND SOURCE**  
**(1976, 1977 and 1968-1977)**



LEGEND (distribution of technical assistance by source):

INNER RING	(regional distribution)	INNER CIRCLE	(overall distribution)	1976	1977	1968-1977
	Agency resources		Agency resources	64.0%	76.2%	62.2%
	UNDP		UNDP	36.0%	23.8%	37.8%

America and 15 in Asia and the Pacific received country programme assistance from the Agency in 1977, followed by the regions of Europe and the Middle East with 13 and 5 country programme recipients respectively. Two additional countries - one in Latin America and one in the Middle East - participated in the Agency's programme of intercountry short-term training projects but did not receive country programme assistance.

76. In 1977, 73 countries and one regional organization received technical assistance from the Agency, as compared with 72 countries in 1976. Including those which acted as hosts for short-term training projects and scientific visits, 27 countries both received and provided assistance (25 in 1976); 22 countries provided but did not received technical assistance in 1977 (19 in 1976) and 46 countries were recipients only (47 in 1976). Thus 95 countries (91 in 1976) participated in the Agency's technical assistance programme in 1977. Figures 2B, 3B and 4B and Table 3 show the extent to which skills and knowledge were exchanged between countries. The above data also include the Agency staff members and the representatives of six other international organizations who served as experts or lecturers in 1977 and are shown in Figure 2B by nationality.

### 3. By type of assistance

77. The distribution of technical assistance in 1976, 1977 and over the period 1968-1977, by type, was as follows:

Type	1976		1977		1968-1977	
	%	\$ 1000	%	\$ 1000	%	\$ 1000
Experts	34.5	2878.9	36.2	3265.4	34.6	20 505.4
Equipment	34.9	2910.7	33.8	3048.7	34.7	20 551.9
Fellowships	30.6	2547.7	30.0	2703.9	30.7	18 156.3
Total	100.0	8337.3	100.0	9018.0	100.0	59 213.6

#### (a) Experts, lecturers and visiting professors

78. In 1977, 388 experts, lecturers and visiting professors from 35 countries and 6 international organizations served a total of 876 man-months at a cost of \$3 265 400; the comparable data for 1976 are: 297 experts, lecturers and visiting professors from 32 countries and 7 international organizations provided 729 man-months of assistance at a cost of \$2 878 900. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1977 totalled \$741 000 for expert services. A total of 62 countries (57 in 1976) was served by 216 country programme experts and visiting professors (174 in 1976), and an additional 172 experts and lecturers (123 in 1976) assisted 18 intercountry projects (47 partly cost-free and 19 cost-free experts and lecturers were provided, as compared with 35 partly cost-free and 36 cost-free experts and lecturers in 1976). Experts' final reports and similar reports which became available in 1977 are listed in Annex IV.

#### (b) Equipment and supplies

79. Including the value of grants of equipment delivered during 1977, 58 countries and 12 intercountry projects (57 and 9 respectively in 1976) were provided with equipment and supplies to a value of \$3 048 700, which represents an increase of about 5% compared with the amount of \$2 910 700 provided in 1976. An additional amount of equipment and supplies valued at \$2 651 600 was still outstanding at the end of the year; this amount is included in the figures given in columns (9) and (10) of Tables 4, 7 and 8.

80. As in previous years, the need to spread the purchase of technical assistance equipment and supplies over a large number of Member States continued to be recognized. In 1977, those items were procured in 24 countries (in 1976, in 23 countries), as shown in Figure 3B, which also includes financial data in respect of equipment grants.

(c) Fellowships

81. A total of 828 candidates from 60 countries and a regional organization received awards under the training programme in 1977 (see Figure 4B and Tables 3 and 6) as against 655 candidates from 60 countries in 1976. The number of man-months of training awarded was 4265 in 1977 as against 4036 in 1976. The higher number of fellowship award holders in 1977 was due mainly to increases in the number of awards for participation in short-term training projects (364 awards in 1977 and 240 in 1976) and in the number of awards for individual study and scientific visits (407 and 57 awards respectively in 1977 as compared with 380 and 35 awards respectively in 1976).

82. Due to the large number of award holders under prior years' programmes who studied in 1977, the value of the training provided by the Agency in 1977 is the highest on record for any one year, namely, \$2 703 900, as compared with \$2 547 700 in 1976. The 1977 total does not include the unliquidated obligations and assistance in kind outstanding (Type II training not yet completed, or not yet begun) as at 31 December 1977, amounting to \$2 963 600; this amount is \$650 000 higher than the combined total of these two items at the end of 1976 and holds promise of a training programme amounting to about \$3 200 000 in 1978.

83. A comparison of the nominations and awards for country programme fellowships in 1976 and 1977 and of all training awards made during these two years is given below. The number of country programme awards rose by 7%, whereas the number of scientific visit awards and those for short-term training projects increased by about 63% and 52% respectively.

	1976		1977	
<u>Country programme awards</u>				
Nominations received		513		506
Effective awards[8]	380		407	
Percentage of nominations which led to effective awards		74.1%		80.4%
<u>Intercountry programme awards</u>				
Scientific visits	35		57	
Short-term training projects	240		364	
Total awards	655		828	

84. The percentage of nominations which led to effective country programme awards in 1977, namely, 80.4%, is the highest observed during the past ten years. Nevertheless, numerous candidates were not selected because they were under- or over-qualified for the training requested, their knowledge of the foreign language in which the training abroad would have been given was not satisfactory, the training requested was not related to the peaceful application of nuclear energy, or because their candidature was withdrawn and, thus, they were not available to take up fellowship awards.

[8] Total number of awards less withdrawals after award as at 31 December 1976 and 31 December 1977 respectively.

(d) Regional and interregional activities

85. In 1977, the Agency conducted 18 intercountry training projects in 16 different countries, in which there were 444 participants from 54 different countries and 1 regional organization. The cost of attendance of 364 participants from 54 countries and 1 regional organization was paid out of project funds (Agency resources and UNDP funds); the cost of attendance of 80 participants, including 67 nationals of host countries, was borne by another organization or programme or by the participant's Government. The statistical figures and financial tables in this report include short-term training project data only in respect of the 364 awards financed from Agency resources and UNDP funds.

86. Five of the 18 intercountry training projects related to nuclear power development; in addition, there was one project in the use of nuclear techniques for the study of chemical residue and pollution problems, one project in the use, design and maintenance of nuclear and related electronic equipment, one project in the use of nuclear techniques in animal production, one project in the use of isotopes and radiation in entomology with special reference to pest management and the sterile-insect technique, one project in the preparation, control and utilization of radiopharmaceuticals, one project in occupational and environmental safety in the utilization of radioactive materials, one project in nuclear law, one project in the application of nuclear techniques in agriculture, one project in geochemical prospecting methods, one project in the design, use and maintenance of nuclear medical equipment, one project in the technical aspects of safeguards and the control of nuclear material, one project in nuclear laboratory technicians' training and one project in plant breeding for disease resistance, including the utilization of induced mutation techniques. Further details on the location, attendance, financing, etc. of these projects are given in Annex III.

(e) Follow-up missions

87. In 1977 nine one-man missions were sent to the regions to determine needs and discuss development plans with requesting countries; 28 countries were visited.

### Part III. DEVELOPMENT OF THE AGENCY'S REGULAR PROGRAMME

#### A. THE IMPLEMENTATION OF APPROVED ASSISTANCE

##### 1. Study of the possibilities of accelerating programme implementation

88. The concern about the increase during the past few years in the amount of unobligated funds in respect of the regular programme led to the convening in August 1977 of a Group of Experts to advise on the implementation of the Agency's technical assistance programme. The report, including the recommendations of this Group, was published in document GOV/INF/329. As recommended inter alia by the Expert Group, a task force was established within the Secretariat to ensure the timely implementation of the Group's recommendations. Action has been taken and continues to be taken on all the recommendations addressed to the Agency:

- (a) Member States have been informed that with the inception of the 1979 regular programme the Agency will welcome requests from Governments for integrated assistance to projects over a longer term and on a larger scale than at present and that staff members of the Division of Technical Assistance visiting recipient countries are stimulating the identification of projects of this kind;
- (b) On the invitation of the Director General, 38 countries[9] have appointed liaison officers as a means of improving communications between the Agency and Governments on day-to-day matters relating to technical assistance. The first of a series of special briefing workshops for these liaison officers is being prepared, to be held at Agency Headquarters early in 1979;
- (c) Preparations started during 1977 for a number of programming missions to be carried out in 1978 to assist Governments in the formulation of requests and in the identification of areas for the provision of medium- and large-scale assistance;
- (d) With regard to the implementation of technical assistance, the distribution of the tasks and responsibilities of the area officers in the Division of Technical Assistance and of the technical officers in the scientific Divisions has been defined, and internal briefing notes have been issued on this subject;
- (e) During 1977 the rate of programme implementation has been monitored and information on the expert man-months approved and provided is being compiled and used in planning. An implementation report on the progress made in providing the assistance approved under the regular programme was prepared for the first time in 1977 and will henceforth be submitted annually to the Technical Assistance Committee of the Board of Governors;
- (f) Alternative means of expert recruitment and equipment procurement were studied in 1977; the more promising of these will be implemented in 1978; and

[9] Algeria, Argentina, Bangladesh, Brazil, Bulgaria, Burma, Colombia, Cuba, Cyprus, Czechoslovakia, Ecuador, Egypt, Greece, India, Indonesia, Iran, Israel, Kenya, Korea, R., Kuwait, Lebanon, Malaysia, Mongolia, Morocco, Niger, Pakistan, Paraguay, Philippines, Qatar, Romania, Senegal, Sri Lanka, Tanzania, Thailand, Turkey, Venezuela, Yugoslavia and Zaire.

- (g) Some other recommendations made by the Expert Group are reflected in the draft of the revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency, a document now awaiting the approval of the Board of Governors.

89. Whereas action was initiated in 1977 on nearly all of the Expert Group's recommendations, their full implementation was not possible in the four months remaining in 1977 after the receipt of the Group's report. Although many of the recommendations foresaw making changes, the effect of which will only be felt over the long term, it is apparent that the continuous and thorough attention given during 1977 to accelerating the rate of programme implementation has already produced some positive results.

## 2. Programme implementation in 1977

90. At the end of each year a review is made to determine whether sufficient funds are available to finance the approved assistance which has not yet been provided. At the end of 1976, for example, it was estimated that \$4 134 000 would be needed, that is, should be "earmarked" or reserved, so that all of the yet-to-be-implemented expert services and equipment not yet ordered could be provided.[10] As the unobligated funds (\$3 903 000) and the value of the equipment (\$19 000) on hand at Agency Headquarters came to only \$3 922 000, it became clear that savings totalling \$212 000 would have to be realized to "break even". The corresponding review made at the end of 1977 revealed that - for the first time in recent years - the sum of the unobligated earmarkings in respect of yet-to-be-implemented technical assistance had decreased, namely, from \$4 134 000 to \$4 010 000 (Table 5A). The unobligated funds on hand to provide this assistance, however, came to \$3 986 000, indicating a decrease of the programme deficit from \$212 000 to \$24 000 during 1977. It is expected that sufficient savings can be realized during 1978 to cover this small deficit.

91. Whereas the sum of the voluntary contributions of Member States to the General Fund and the miscellaneous income received during 1977, for the provision of technical assistance under the regular programme, increased by \$392 000 or 7% as compared with 1976, the volume of the assistance provided from these funds in 1977 increased by more than \$1 million or 26% over the preceding year. This increase is the highest in the history of the regular programme in respect of total expenditures and does not reflect the extra-budgetary funds spent on assistance provided under the regular programme. Of the total unobligated earmarkings at the end of the year, 79% was needed for projects approved under the 1976 and 1977 regular programmes and only 21% pertained to assistance approved under earlier programmes. Consultations with Governments continued in 1977 to determine whether unimplemented technical assistance provisions approved a number of years ago were still needed. Although in some cases cancellations or updated resubmissions were agreed upon, much of the assistance approved under the regular programmes for 1972 through 1975 which has not yet been implemented constitutes phasings of assistance over a number of years in concurrence with and often at the request of the Governments concerned. In some cases such phasing was planned and programmed from the start in order to accumulate sufficient funds for a project, because the Government realized that the submission of a single request involving such a large sum could not have been approved in any one year due to the financial limitations of the regular programme. A number of what are in essence multi-year projects will therefore always remain and be reflected in the Agency's accounts as unobligated earmarkings, even if, theoretically, all other delays in the provision of approved assistance could be avoided. Implementation delays are inevitable; in this connection it is noteworthy that, for the first time since 1971 the share of the funds available for expenditure that was actually spent in providing the assistance approved for the current year did not continue to decline but rose from 27% in 1976 to 30% in 1977.

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[10] See Table 5 in document GC(XXI)/INF/169.

There are, therefore, a number of indications that the observed trend of an increasing backlog of assistance provisions has been arrested during 1977. Ample scope still exists for the improvement and acceleration of programme implementation but further success in this direction may accentuate the problem of the composition of the available cash resources.

## B. THE STATUS AND COMPOSITION OF CASH RESOURCES

92. As at 31 December 1977 a total of \$7 613 000 was available in cash resources for the implementation of the regular programme, excluding the extrabudgetary funds contributed for this purpose. Against this amount, a total of \$7 637 000 has been earmarked for the provision of approved assistance; this sum consists of \$3 627 000 in unliquidated obligations and \$4 010 000 in unobligated earmarkings. As mentioned in paragraph 90 above, this programme deficit of \$24 000 is negligible and can be met from the residual savings realized when assistance to projects has been completed.

93. In accordance with the advice of the Expert Group[11], the Agency reviewed the currency composition of these funds as at 31 December 1977 and found that 37% or \$2 814 000 of the \$7 613 000 total was made up of selected non-convertible currencies. This situation is a cause for concern because only \$1 482 000 of this amount (\$920 000 in unliquidated obligations and \$562 000 in earmarked funds) can be used for assistance approved under the regular programme for 1977 and earlier years. This means that the equivalent of \$1 332 000 in these non-convertible currencies will be left over when the approved assistance which can be provided using these currencies has been completed.

94. The situation in respect of the available convertible currencies is exactly the reverse. Of the \$7 613 000 in cash resources, \$4 799 000 was available in convertible currencies against which assistance totalling \$6 155 000 has been approved and for which only convertible currency is usable. This means that \$1 356 000 in convertible currency is needed to implement these provisions. The available unobligated funds have thus far served as a buffer; however, further increases in the rate of implementation will inevitably and rapidly lead to a liquidity crisis, when no more convertible currencies are available to execute the approved programme.

95. Indications are that the magnitude of this problem will increase in 1978. An analysis of the assistance requested and approved under the 1978 regular programme revealed that only a small share of that programme can be provided using the non-convertible currencies under discussion. It has been estimated that the equivalent of \$1 million of the voluntary contributions received in 1978 in these currencies cannot be used for the provision of regular programme assistance and, thus, it is now estimated that by the end of 1978 the unobligated holdings in these currencies against which no earmarkings can be made will amount to \$2.3 million.

96. As the Agency's regular programme is based on the requests of its Member States, the possibilities of making more extensive use of these non-convertible currencies are not completely within the control of the Agency. Efforts are being made to identify suitable projects which can make effective use of assistance that can be financed from non-convertible currencies; it cannot be assumed, however, that satisfactory solutions can be found within the framework of the programming process currently used by the Agency. It is anticipated that some changes will have to be made in 1978, such as limiting the value of the expert services, equipment and training to be provided under the 1979 regular programme to the income likely to be received in convertible currency, as first steps towards preventing a liquidity crisis.

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[11] In recommendation 13 the Agency was advised to follow closely developments in the accumulation of unobligated funds and in the composition of such funds, so as to ensure ample lead time to take whatever measures may be necessary to avoid potential financial difficulties.

### C. INFORMATION ON SOME SELECTED PROJECTS

97. Information is given below on a cross-section of the projects receiving assistance under the Agency's regular programme in 1977:

- (a) Radiotherapy physics in Afghanistan: The cobalt-60 equipment needed for the radiotherapy unit was delivered in June and installed with the help of an Agency expert. This assistance is being co-ordinated with bilateral aid provided by Hungary; one of the Agency experts is Hungarian and the associated fellowship training has been provided in Hungary under bilateral and Agency awards. It was learned during the recent visit of the Agency's expert to Afghanistan that the fellows trained for this work are no longer available to the project. Thus, unless they return or their replacements receive the necessary training abroad, the assistance provided by the Agency cannot make the expected impact;
- (b) Slow neutron inelastic scattering in solids and liquids in Brazil: The Agency's expert demonstrated the use of a triple-axis spectrometer to study hydrogenous compounds, their low frequency motions and molecular changes during transition phases, autodiffusion and lattice dynamics. In addition to providing in-service training, the expert drew up instructions for the operation of the spectrometer as well as computer programs for the processing of measurement data. Together with local scientists, he constructed a fully automatic control device for the spectrometer from electronic components available in Brazil;
- (c) Uranium prospecting in Ecuador: The reorganization of a governmental body was the cause of some difficulty for the Agency's expert, owing to differences of opinion in respect of the designation of his counterparts and the support available for the execution of his assignment. These difficulties were eventually resolved. (Similar confusion may have limited the effectiveness of the two-month assignment of an Agency expert in dosimetry. On the other hand, the short-term visit of an Agency staff member to provide advice in hospital physics was very successful; he evaluated the procedures used in a number of radiation therapy departments and formulated recommendations, especially regarding dosimetry, which could improve the effectiveness of local therapy procedures);
- (d) Use of radioisotopes in agriculture in Iraq: The Agency was requested to assist the Department of Biology and Agriculture of the Nuclear Research Institute, Tuwaitha, in its plant breeding work. The project's objective is to use radiation-induced mutation techniques to increase the protein and amino acid content in barley, as well as to improve its resistance to lodging and disease and its tolerance to salinity. The Agency's expert made two visits to the project and is confident that the research goals, based on the priorities established, can be attained. A work programme extending into 1982 has been prepared but its success may well depend on whether some of the technical staff receive advanced training;
- (e) Research reactor centre in Malaysia: A number of Agency experts visited the Tun Ismail Atomic Research Centre to help local officials finalize the design of the research reactor hall and the associated laboratories, to review the data compiled in respect of the proposed reactor site and to prepare a detailed preliminary safety analysis report. The experts also assisted in finalizing the design of the facility for isotope production and advised their counterparts on the furnishing of laboratories and the selection of needed instrumentation;
- (f) Mediterranean fruit fly control in Mexico: In response to an emergency request for technical assistance the Agency sent a consultant to Mexico to advise the Government on the steps that should be taken to ward off the incursion of the Medfly. The sterile-insect-release technique has been proposed as one of the

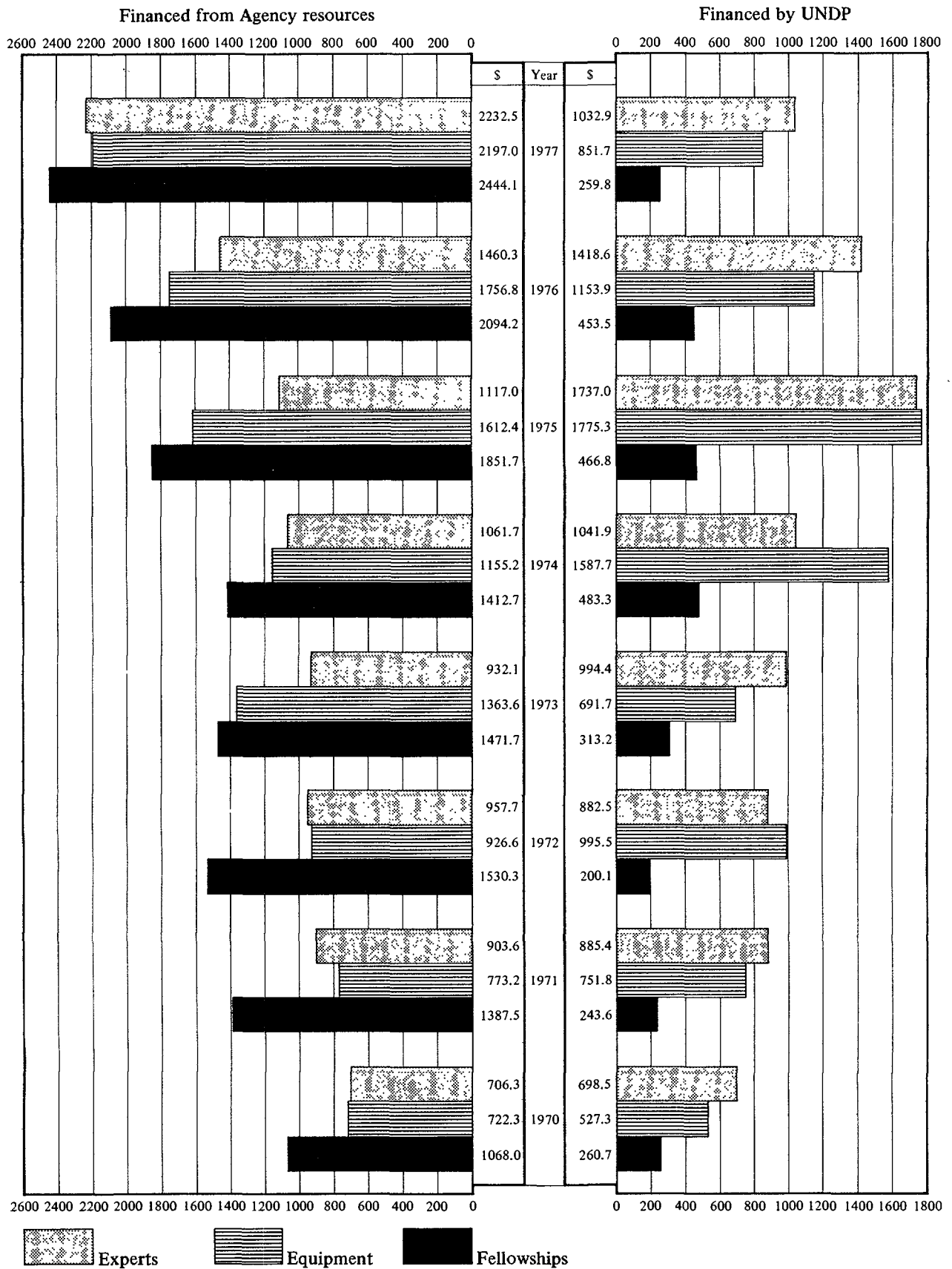


most effective means of controlling this pest. A cobalt irradiator was ordered for use in connection with the fly breeding programme; this important activity of the three-year project is scheduled to commence in 1978. The cost of the assistance provided in 1977 and of the irradiator on order are being met from the special cash contribution of the Government of Canada; follow-up assistance to this project was approved under the 1978 regular programme;

- (g) Uranium prospection in Peru: Equipment and expert services were provided to assist the Government in planning its long-term programme. Advice was also given on prospecting methodology, manpower development and training needs; in addition, the expert helped in the evaluation and the preparation of the areas selected for detailed prospection within the framework of the large-scale follow-up assistance now being provided by the Agency from UNDP funds;
- (h) Nuclear electronics in Poland: Assistance is being given to the Institute of Physics and Nuclear Techniques of the University of Mining and Metallurgy, Cracow, to establish a nuclear electronics laboratory for teaching purposes. Among the items of equipment supplied thus far are an oscilloscope and a precision pulse generator. The Agency's expert organized in-service training for Institute staff members, emphasizing microcomputer-oriented activities, and drew up a course of intensive training in this area. Two laboratories are to be equipped with microcomputers, and the expert is scheduled to return to the Institute in 1978 to demonstrate practical applications of such equipment;
- (i) Neutron activation analysis in Portugal: A multichannel analyser and associated expert services were provided to the Nuclear Physics and Engineering Laboratory at Sacavém, to help strengthen the Laboratory's analytical capability in geochemistry, environmental science and chemical research. The Agency's expert prepared programs for the Laboratory's PDP-15 computer, modified the interface equipment to ensure trouble-free transmission of data from the multichannel analyser to the computer, and made a number of recommendations concerning the organization of the work, the use of the available equipment and the need for an on-line printer so that the capacity of the PDP computer can be exploited more efficiently;
- (j) Use of radioisotopes in agriculture in Sri Lanka: The Atomic Energy Authority requested assistance in establishing a co-ordinated research programme on fertilizer utilization, soil moisture studies and general soil-plant research, using isotope and radiation methods and technology. One aspect of the project's activities is the investigation of the efficacy of locally available rock phosphate, as compared with imported phosphorous fertilizers, in connection with economically important crops such as rice, tea, coconut and rubber. Another objective is to develop methods of conserving soil moisture, a high-priority concern of the plantations growing tea, coconut and rubber on an industrial scale. Work in these two areas will be carried out in co-operation with the local research institutes specializing in the study of these crops. The last requirement is the provision of training for the local staff in the use of nuclear techniques in soil-plant research. The project's work programme has been initiated and good progress is being made; and
- (k) Raw material prospection in Thailand: Some equipment and nine months of expert services were provided to the Department of Mineral Resources to assist the Government in exploring for uranium in the north-eastern part of the country. This is the first assistance provided to Thailand by the Agency in nuclear raw materials prospection since 1960-1961. The Agency's expert helped in conducting surface radiometric surveys, soil sampling, and gamma logging of drilled holes. The number of new radioactive anomalies and their distribution is encouraging and justifies follow-up exploration.

FIGURE 6

TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY  
(in thousands of dollars)



Part IV. ASSISTANCE ACTIVITIES FUNDED FROM  
OTHER RESOURCES

A. EXTRABUDGETARY FUNDS

98. It can be seen in paragraph 67 above that \$1 944 000 was made available in 1977 in the form of special cash contributions for the provision of technical assistance through the Agency. As more than half of this amount was received in August 1977, only 30% of these funds could be spent by 31 December 1977; an almost equal share had been committed but not yet spent (unliquidated obligations) by the end of the year; see Tables 1, 4, 5B, 7 and 8 and Annex II, A.

99. Approximately \$58 500 of the special contribution made by the Government of Canada in 1977 was earmarked to provide emergency assistance to a project in Mexico and to assist a footnote a/ project[12] in Senegal under the 1977 regular programme; the balance of these funds has been allocated to assist footnote a/ projects under the 1978 regular programme. The special cash contribution received from the Government of the Netherlands was used to meet the cost of the associate expert it made available during 1977 (the Netherlands has furnished the Agency with 1-2 associate experts per year on a full-time, cost-free basis since 1973). The funds made available by the Government of Sweden in 1977 were earmarked as follows: 44% to continue the provision of large-scale assistance to the agricultural research project in Bangladesh, 33% for training courses and 23% for fellowships. No new funds were received from the Government of the Soviet Union in 1977; however, the roubles on hand during the year yielded a \$4000 exchange rate gain which is reflected in the Agency's accounts and partially defrayed the cost of the training provided from these funds in 1977. Except for \$40 000 earmarked to help meet the cost of certain training courses, the entire special cash contribution made by the Government of the United States of America in 1977 was earmarked for the provision of expert services and equipment; \$1.1 million is to be used to assist 27 projects, including 12 footnote a/ projects, approved under the 1977 regular programme (to provide 121 man-months of expert services and equipment estimated to cost \$693 500). Overall, the largest share of the extrabudgetary funds made available in 1977, namely, about 40%, was earmarked for assistance to be provided to projects in agriculture; the next largest shares were 15% for assistance to nuclear medicine projects and 12% for assistance to nuclear safety projects.

B. UNDP FUNDS

100. A complete list of the operational projects receiving UNDP assistance through the Agency in 1977 is given in Annex VI, and data on the fellowships and the training course financed from UNDP funds in 1977 are provided in Tables 3 and 6. Information is given below on country programme projects assisted by UNDP, including six projects that were initiated in 1977:

- (a) Exploration for uranium and thorium in Bangladesh: This two-year, small-scale assistance project, with a UNDP input of \$33 756 and a Government contribution of about \$105 000, was undertaken to carry out a systematic reconnaissance survey for uranium in the Chittagong and Sylehet districts; preliminary work in this region had already been carried out by the Bangladesh Atomic Energy Commission with assistance from the Agency's regular programme;
- (b) Application of nuclear technology in agriculture in Brazil: UNDP large-scale assistance to the project, conducted at the Centre for Nuclear Energy in

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[12] Projects for which no funds were available but were approved on the assumption that they could be implemented in substitution for other approved assistance for which funds were expected to be available, or if additional contributions of funds or services became available.

Agriculture (CENA) in Piracicaba, started in April 1972 and was scheduled for completion in April 1978; arrangements have now been made to continue UNDP assistance to the project until the end of 1978. Some budgetary restrictions affecting the counterpart organization have led to a general slow-down in project activity; however, funds were obtained from various local organizations and have allowed for more intensive work in specific areas. Work continued in isotope hydrology in the Amazonas; the chemistry, physics, fertility and microbiology of soils; plant biochemistry; entomology; plant breeding; animal science and analytical chemistry. Significant project achievements are: the stem-rust-resistant wheat mutant "TICENA-4", now being used for crosses, outyielded the parent variety by 60% in recent trials; a bush-type mutant of the Carioca bean variety has been developed which has a high-yield potential; and an improved method has been developed for germinating embryos of Phaseolus beans. In addition to other forms of recognition received for its outstanding work, CENA has been assigned national responsibility for selecting strains of Rhizobium phaseoli to be used for the commercial production of inoculum;

- (c) Nuclear manpower qualification and training in Brazil: This project, started in June 1977 and receiving large-scale UNDP assistance, consists of two parts: (i) general training and (ii) the nuclear power operators' training centre. The objectives of the general training component are to plan and implement a training programme in nuclear power technology encompassing the entire nuclear fuel cycle for light-water reactors; nuclear power plant design, construction and commissioning; quality assurance standards for nuclear power plant components; and power plant safety. Training centre activities involve the establishment of a facility to train staff in various aspects of the operation of nuclear power plants, the training of instructors, the commissioning of a training simulator and the initiation of training for reactor operational staff. The timing of expert missions for this project is being synchronized with the important stages in simulator design, construction, installation and testing. Another important duty of Agency experts is the establishment of the training requirements and qualifications of the instructor group which will assume responsibility for training operational staff. The training component of the project places greatest emphasis on on-the-job experience related to the various aspects of the simulator programme;
- (d) Nuclear power plant in Chile: This project aims to create the foundations of infrastructures, both human and technical, which are needed for the implementation of Chile's nuclear power programme. According to the Government's national development plan, Chile is scheduled to have an installed nuclear power capacity of 500 MW(e) by 1987;
- (e) Exploration for uranium in Eastern Macedonia and Thrace in Greece: UNDP large-scale assistance has been provided to this project in two phases. Whereas the objectives of phase I included the systematic low-density survey of the project area (28 400 km<sup>2</sup>) and the training of national personnel, during phase II emphasis was given to medium-density and detailed exploration of areas identified during the reconnaissance phase as favourable to uranium mineralization. Methods and techniques employed for the exploration conducted during phase II comprised soil-gas radon measurement, stream-sediment analysis, soil and water sampling, drilling and logging, detailed mapping, magnetic surveys, sample-site radioactivity measurement, geochemical analysis and computer-based data processing. In-service and fellowship training, provided throughout the duration of the project, and the geological/radiometric information obtained were the most important project achievements. UNDP large-scale assistance was completed in September 1977;
- (f) Use of ionizing radiation for the sterilization of medical supplies in Hungary: The sterilization plant was officially inaugurated in February 1977 and has been operating successfully ever since. The project stimulated the automated pro-

duction of disposable hypodermic needles and 40 million needles have been sterilized to date. During a tripartite review held in Budapest in March 1978 this project was cited as constituting a model for future projects of this kind; the terminal report will therefore highlight the techniques developed by the project which might successfully be applied elsewhere. UNDP feels that this facility could be used as an international training institute and that specialists from the plant could be used for consultancies to other countries embarking on similar programmes;

- (g) Radiation processing demonstration facility in the Republic of Korea: UNDP large-scale assistance to this project at the Korean Atomic Energy Research Institute was concluded in 1977. The project's objectives were to study the feasibility of sterilizing medical products by irradiation to demonstrate the effectiveness of this method to local manufacturers of pharmaceuticals and single-use medical products, to develop a programme of radiation technology for the surface coating of plywood products, to develop new products of commercial interest using radiation processing techniques and to promote collaboration with industry and the commercial sector in the application of radiation processing technology. The radiation facilities provided under the project consisted of a  $^{60}\text{Co}$  100 kCi gamma-ray irradiator and a 300 kV electron accelerator. As a result of this project a number of manufacturers of medical products in Korea have accepted radiation sterilization as an economical and preferred alternative to conventional sterilization processes. Eighteen manufacturers have made use of the cobalt-60 radiosterilization facility, and the industrial acceptance of the results obtained in work on textile-fibre modification by radiation was also good;
- (h) Training and research in applied nuclear physics at the Faculty of Sciences (Rabat) in Morocco: Considerable progress was achieved in the implementation of this project in 1977. Following the appointment of an expert in radiochemistry, a research group was formed to deal with chemistry problems, in particular those related to the utilization of the neutron generator, and several consultants promoted the introduction of techniques and topics pertaining to applied nuclear physics. Of special interest is the use of nuclear track detectors in uranium exploration; this technique was successfully demonstrated in a field experiment. Construction of the neutron generator laboratory proceeded and the installation of the accelerator is planned for April 1978; preparatory work for its utilization is an important aspect of the programme. Making use of the initial momentum which UNDP assistance provided, a large national project has been initiated with the aim of establishing a nuclear research centre to meet the academic needs of the University as well as to help satisfy the requirements of the Moroccan economy;
- (i) Use of nuclear techniques in animal production in Nigeria: The project was initiated to promote the establishment of national research capability in respect of the application of nuclear techniques in support of the Government's programme to increase livestock production and to improve the nutritional value of the national diet. Emphasis will be given to the application of radiotracer techniques to determine the production potential of grazing areas and to study the nutritional cycle of animals;
- (j) Nuclear energy in Peru: UNDP large-scale assistance to this project was initiated in July 1977. Unique among UNDP-assisted projects in the nuclear field, the project embraces concurrently five different activities: (i) the introduction of nuclear power; (ii) the evaluation and development of uranium resources; (iii) the application of nuclear techniques in agriculture and livestock-breeding; (iv) radiation protection and nuclear safety; and (v) general project co-ordination and administration. The project is being administered by the Peruvian Nuclear Energy Institute (IPEN) in Lima. In 1977 emphasis was placed on the systematic exploration for uranium and associated minerals,

the evaluation of uranium reserves, and the training of personnel in modern exploration techniques. An area of approximately 700 000 km<sup>2</sup> has been identified as variously favourable to uranium mineralization, and two regions within it have been selected for reconnaissance. Although difficulties have been experienced with regard to the importation of project equipment, it is felt that the situation will improve;

- (k) Training and consultancy in nuclear power plant safety analysis, engineering and public information in the Philippines: The aim of this project is to support the Government's nuclear power development programme through the provision of expert services and the training abroad of local staff in subjects such as nuclear power plant licensing and regulation, safety, engineering and public information. Implementation of the training component and the provision of expert services continued in 1977;
- (l) Development of nuclear technology in Romania: A review mission fielded in 1977 by UNDP to evaluate the project's progress thus far produced a very positive assessment of its achievements. The extension of UNDP assistance to the project during a second phase was recommended by this mission and approved by UNDP in January 1978. Project work during phase II will focus on the preparations for the commissioning of the first nuclear power reactor in Romania. Activities to be covered include quality assurance, reactor safety and testing of reactor components. In recognition of the progress made during phase I the Institute of Nuclear Technology has been redesignated as the Institute for Nuclear Power Reactors (INRP); and
- (m) Exploration for uranium in South-West Anatolia in Turkey: UNDP large-scale assistance to this project began in 1974 and was completed in 1977; during this period some uranium ore reserves were identified and evaluated, and the counterpart staff was trained in the techniques of modern uranium exploration. An area of some 3000 km<sup>2</sup> was evaluated and two ore deposits were discovered. The training component of the project relating to the transfer of technology was considered a success; the phasing and co-ordination of activities (mapping, sampling, drilling and laboratory analysis) represent essential aspects of modern uranium exploration in which the counterparts received training. Detailed job descriptions and a functional organization chart were introduced to optimize the utilization of project personnel.

### C. SIDA FUNDS

101. On 19 December 1969 the Agency signed an agreement with the Government of Sweden governing the manner in which the two parties would co-operate in the provision of technical assistance to developing countries. Furthermore, the Government of Sweden agreed to make funds available to the Agency - through the Swedish International Development Authority (SIDA) - for the implementation of mutually agreed programmes and projects[13]. In the interim the Agency has conducted 11 training courses and arranged study programmes for the holders of 86 fellowship awards which were financed by SIDA. In addition to providing opportunity for participation in training courses and for individual study abroad, SIDA also finances the provision of experts and equipment to certain countries and allocates the resources therefor on the basis of an "indicative planning figure", along the lines adopted by UNDP. Thus, ministries in the eligible countries submit requests for assistance through the national co-ordinating authority to SIDA, which arranges for a United Nations organization to serve as the executing agent for the assistance which has been approved.

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[13] The text of the agreement is reproduced in document INFCIRC/138.

Information follows on the two projects for which the Agency serves as SIDA's executing agent:

- (a) Development of the Institute of Nuclear Agriculture in Bangladesh: This project was initiated in 1975 to assist the Government of Bangladesh in establishing a laboratory at Mymensingh and in planning and implementing, in co-operation with other agricultural research organizations in the country, problem-oriented research requiring the use of isotope and radiation methodology to increase crop production. With the completion of the physical facilities and upon acquisition of most of the major items of equipment, the Institute was formally inaugurated at the end of 1977. Owing largely to the slow recruitment of counterpart staff, however, the implementation of the fellowship training component fell significantly behind schedule and has affected negatively the scheduling of expert visits to the project. Despite these difficulties, reasonably good progress has been made in the planning and implementation of research work. Among the numerous research activities now under way are projects for developing high-yielding, early-maturing and disease-resistant varieties of rice, jute, mustard, soybean and pulses, using radiation-induced mutations; studies are also being made on (i) methods of applying fertilizers to various crops using isotopically labelled compounds, (ii) micronutrient deficiency in rice and (iii) the improvement of atmospheric nitrogen fixation by grain legumes. Results of practical importance already obtained include the evolution of two new early-maturing and high-yielding varieties of rice - IRRATOM-24 and IRRATOM-38 - and three improved varieties of jute - Atompat-28, -36, and -38. Excellent co-operation and collaboration exist between the Institute and other bodies such as the Bangladesh Agricultural Research Council and the Bangladesh Agricultural University on work aimed at increasing crop production at the village level. This is one of the most important aspects of this project and of all research projects, for, unless such work is problem-oriented and the findings properly applied, the investment will be excessive and the results will remain intangible;
- (b) Strengthening of nuclear research in agriculture in India: UNDP large-scale assistance was provided to this project during 1968-1974 (see paragraph 35 above for information on project activities during that period). The four research institutes previously mentioned will participate in this follow-up phase of the project. Detailed objectives and plans for the implementation of the various research programmes were worked out in collaboration with the Indian Government and SIDA, and the project document was finalized in 1977. It foresees a SIDA contribution of about \$2.5 million, to provide 142 man-months of expert services, equipment estimated to cost \$1.1 million, and 329 man-months of fellowship training. The Government's contribution to the project to cover the cost of the required manpower, equipment and supplies will be \$2 million. SIDA assistance to the project is scheduled to commence in 1978.

## Part V. TRENDS AND CONCLUSIONS

102. The year 1977 not only marked the end of the first 20 years of the Agency's technical assistance programme but is also likely to be the watershed between years that yielded less and more than \$10 million of aid. The \$5 million mark was exceeded for the first time in 1972, when 71 countries and a regional organization received assistance from the Agency. Five years later the total amount of aid had increased to \$9 million, but the composition of the countries participating in the Agency's technical co-operation programme is nearly identical, with minor fluctuations from year to year. Other, unmistakable changes have taken place such as the steady progress made in introducing nuclear methods and technology in numerous areas in developing countries throughout the world and the resulting changes in the kind of expertise and equipment requested from the Agency.

103. The increase in expenditures in 1977 was the highest in the history of the regular programme and for the first time in many years the total of unobligated earmarkings did not rise any further. The trend of an increasing backlog in the provision of approved assistance which has been of great concern in the past few years seems therefore to have been arrested during 1977. It is too early to judge whether this trend has been reversed; if so, this will cause new concerns related to the currency composition of the available resources in respect of the potential liquidity problem.

104. In 1970, when the target for voluntary contributions to the General Fund was still \$2 million and the share of voluntary contributions allocated for the provision of technical assistance was \$1.5 million, the non-convertible currencies held by the Agency did not constitute a problem. In earlier years many recipient countries were still at the early stages of introducing nuclear techniques and could use basic equipment not requiring tropicalization. For the purchase of this type of equipment these particular currencies could readily be used. During the intervening years the level of the target and the quantities of the non-convertible currencies have steadily risen. At the same time the difficulties of matching more frequent requests for very specific and more advanced equipment on the one hand, with the assortment readily available for purchase with non-convertible currencies on the other, have increased considerably. In a programme calling for the utilization of all available resources the result has been a rapidly growing balance of non-convertible currencies that cannot be put to immediate use. This situation has serious implications for the future ability of the Agency to deliver the full approved regular programme. The Agency is making every effort to cope with the problem. If the present trends in the currency composition of available resources continue, special measures will become necessary in future years which may have a restrictive effect on annual programming.

105. The incorporation of the so-called footnote a/ projects into the regular programme has added a new dimension to the Agency's technical co-operation activities. India and the USA provided assistance through the Agency to 12 of the 32 footnote a/ projects included in the 1976 regular programme. The special cash contributions made by Canada and the USA last year made it possible to meet all of the footnote a/ projects included in the 1977 regular programme. Although it is realized that it takes time for Governments to make new provisions in their national budgets for foreign aid, it is hoped that more Member States will be able to avail themselves of the opportunity of underwriting, and meeting the cost of, the provision of technical assistance to one or more of these technically sound projects. Increased cash and in kind contributions will ensure the continued effectiveness of this novel programming device.

106. In response to one of the recommendations made by the Group of Experts convened by the Director General in 1977 to advise on the implementation of the Agency's technical assistance programme, the Secretariat prepared a progress report on the implementation of the regular programme which was submitted to the Technical Assistance Committee of the Board of Governors. In that report it was indicated that 60% of the unobligated balance of regular programme funds as at 30 September 1977 was in respect of expert services. This figure becomes understandable when it is considered that the projects approved under the 1977 regular programme were also included in the analysis and that, for proper project



execution, it is often necessary that the associated equipment should be available at the project site before the expert begins his assignment. On the other hand, in respect of almost half of the open expert posts no candidate had yet been selected, although numerous candidates were under consideration. With the continuing expansion in the nuclear power field in the developed and in the developing countries, the shortage of experts in nuclear safety and a number of critical areas relating to the planning of manpower development programmes and the construction of nuclear power plants is expected to become acute. In this connection it should be pointed out that the reactor exporting countries have a special responsibility vis-a-vis the importing countries in making specialists available for the provision of the advice needed at various stages of nuclear power projects. In this realm the Agency can serve as an efficient instrument in matching up the available expertise with the expert posts that have to be filled, to make technical co-operation a reality.

107. The concept of Technical Co-operation between Developing Countries is receiving increasing attention in the United Nations System. The traditional objectives of technical assistance, the transfer of skills and knowledge, should not create new dependency but should lead to self-sufficiency. Through a combination of the Agency's programmes of fellowship and in-service training and its direct assistance to institutes in developing countries, the national staff will increasingly be able to work independently, to the point where their need for outside help is similar to the periodic requirements for consultants by business and Governments in the more advanced countries. The opportunity for TCDC also in the Agency's field of competence will increase in line with the achievement of a more widespread and equitable distribution of sources of nuclear technology in the world.

108. Along with the welcome increase in technical assistance resources there is ample scope for a restructuring of the Agency's regular programme. The substitution of many small and often single-component projects by a number of well-prepared multi-year projects should not only yield economies of scale but also make a more lasting impact in the recipient countries provided such projects have been integrated into the countries' development plans. The introduction of long-term programming of the assistance available from the Agency will not eliminate the need to assist small projects but it can be expected to make the regular programme more coherent. Another possible advantage of encouraging the developing countries to submit requests for longer term assistance is that such projects would also give the planned-economy countries a better opportunity of determining how their manufacturing capacity could best respond to the requirements contained in the Agency's technical co-operation programmes.

## ANNEX I

### STATISTICAL TABLES

#### Introductory Notes

#### Resources

1. Figure 1 and Table 1 show the resources made available for approved field programmes of technical assistance and thus do not include UNDP overhead cost allocations. In addition, data in respect of offers of assistance in kind have been updated to 31 December 1977; for example, the value of Type II fellowship offers has been adjusted, where necessary, to reflect the resources that were actually available when fellows took up their studies under Type II arrangements. The estimated value of all offers of assistance in kind in support of a given year's technical assistance programme is shown in column (1d) of Table 1. With the introduction of a new column in Table 1 concerning the extrabudgetary funds made available to the Agency for the provision of technical assistance, the extrabudgetary funds formerly included in the "in kind" totals have been deducted therefrom, which accounts for the lower totals in the "in kind" column in Table 1 for the years prior to 1977.

2. All monetary values appearing under the heading "in kind" are estimated in accordance with the following guidelines:

- (a) Experts. The value of the services of each cost-free expert is estimated on the basis of the average salary of an equivalent expert engaged by the Agency and the applicable daily subsistence allowance as established by UNDP, plus the cost of a round-trip air ticket; analogous criteria are used in estimating the value of the services of cost-free and partly cost-free lecturers;
- (b) Equipment. The value of equipment is estimated according to the offer made by the donor Government (at the later, "assistance provided" stage, however, the value to the relevant project is based on the actual costs incurred by the donor Government); and
- (c) Fellowships. The value of Type II fellowships is estimated on the basis of the monthly stipend rate either as proposed by the host country or as established currently by UNDP, multiplied by the duration of the award in months. The estimated travel costs have been added if they were paid by the host country. (Training course stipends and subsistence allowances paid under this heading, however, are based on actual payments.)

These values and the totals in which they are included must therefore be considered as approximations.

#### Assistance provided

3. The financial statistics given in Tables 4, 5, 7 and 8 relate, in the first instance, to actual cash payments against 1977 and prior years' obligations (shown according to the year(s) in which the cash payments were made) plus the total value of the assistance made available in kind (shown according to the year(s) in which it was provided). Thus, the balance of funds - for example, obligated but not spent in 1977 - is not included in the financial data relating to the assistance provided, but is shown separately in column 9 (see, for example, the 1977 entries in Table 4); the total cumulative balance of funds obligated in 1977 and prior years, but not yet spent as at 31 December 1977, is given at the bottom of this column in Tables 4, 7 and 8.

4. Assistance in kind has been separated into two parts. The first part consists of assistance which has been provided - for example, fellowship training already provided - expressed in terms of estimated cash expenditures. The second part is made up of assistance which is in the process of being provided - for example, fellowship training not

yet completed - which is equivalent to unliquidated obligations (see column (10) in Tables 4, 7 and 8). The provision of expert services and equipment in kind has been shown in the same way.

5. Some minor corrections have also been made in the financial statistics relating to assistance provided in kind during prior years which take into account, inter alia, candidates who were withdrawn subsequent to the award of Type II fellowships, that is, after 31 December of a given year. Further, as the Agency exercises no financial control over assistance provided in kind, delay is occasionally experienced in receiving information on equipment deliveries, interruption in fellowship training, etc.

#### Types of assistance

6. (a) Experts. When not shown separately, the assignments of lecturers and visiting professors are included under the heading "Experts". With regard to Table 6, it should be noted that under "Intercountry programmes" the assignments of a number of experts are not subdivided by region but included, with associated training awards, under the heading "short-term training projects";
- (b) Equipment. As can best be seen in Table 7, the total assistance provided under this heading is the sum of the amounts disbursed for equipment and supplies in respect of country and intercountry programmes; and
- (c) Fellowships. In Table 3, where awards are classified by place of study, columns relating to short-term regional training projects and scientific visits have been introduced in order to reflect more accurately the valuable contribution made by host countries. The UNDP and Agency country awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1977 (all notifications of non-acceptance by the proposed host countries and of withdrawals by the nominating countries communicated to the Agency by the close of the year have been taken into account). In Table 6 the number of fellowships classified by nationality does not include awards for short-term training projects and scientific visits, since their inclusion would significantly distort the statistics relating primarily to holders of fellowships of 6-12 months' duration. Although awards for short-term training projects and scientific visits are included in Table 6 under "UNDP" and "Agency" and are financed under "in kind" and "multi-bilateral" arrangements, the regular programme or UNDP, they are not in the same category as Agency or UNDP country awards. Furthermore, in the financial summaries (Tables 7 and 8) the expenditure on, for example, short-term training projects is not shown as assistance to individual countries but to "Intercountry programmes". None of the tables includes any reference to local participants in short-term training projects (see Annex III).

#### Intercountry programmes

7. In the broadest sense; this heading covers expenditure on regional projects for which experts' services only were provided (for example, by regional advisers), regional and interregional projects for which experts, equipment and fellowships were provided (for example, short-term training courses), and regional and interregional projects for which fellowships only were provided (for example, scientific visits).

#### Subcontract activities and funds-in-trust arrangements

8. The statistical tables do not include data relating to services provided by the Agency under subcontracts to other organizations, or in respect of projects carried out at the expense of developing countries under funds-in-trust arrangements (see Annex II, B).

#### Figures and percentages

9. Due to the rounding-off of monetary amounts to the nearest hundred or thousand dollars, the totals indicated in various places may differ slightly. In preparing figures and tables, percentages have also been rounded off.

A. TECHNICAL ASSISTANCE RESOURCES

Table 1

Available resources: 1968-1977  
(in thousands of dollars)

Year	Agency				Sub-totals		TOTAL (1) + (2) (3)
	Voluntary contributions (1a)	Miscellaneous income (1b)	Extrabudgetary funds (1c)	In kind <sup>a/</sup> (1d)	Agency (1)	UNDP (2)	
1968	1 184	164	-	565	1 913	1 422	3 335
1969	1 133	253	13	658	2 257	981	3 238
1970	1 535	214	61	894	2 704	1 513	4 217
1971	2 072	152	218	1 197	3 639	1 775	5 414
1972	2 486	150	60	900	3 596	2 072	5 668
1973	2 847	277	267	1 032	4 423	1 964	6 387
1974	3 085	263	369	1 114	4 831	3 082	7 913
1975	4 219	321	108	1 212	5 860	3 941	9 801
1976	5 044	430	661	1 735	7 870	3 002	10 872
1977	5 335	531	1 944	1 632	9 442	2 144	11 586
1968-1977	29 140	2 755	3 701	10 939	46 535	21 896	68 431

<sup>a/</sup> Estimated; see Introductory Notes, paras 1 and 2, to this Annex.

Table 2

Funds for the Agency's regular programme of technical assistance: 1968-1977  
(in thousands of dollars)

Item	1968-73	1974	1975	1976	1977	1968-77
Target for voluntary contributions to the General Fund <sup>a/</sup>	14 500	3 000	4 500	5 500	6 000	33 500
Share of target budgeted for technical assistance	13 896	3 000	4 500	5 500	6 000	32 896
Amount pledged	12 060	3 085	4 220	5 044	5 353	29 762
Actually made available for technical assistance <sup>b/</sup>	12 667	3 348	4 540	5 474	5 866	31 895

<sup>a/</sup> Until 1972 a share of the funds from voluntary contributions was used to support other operational programme activities of the Agency; up to 1967 most of this share was used for research contracts, and over the period 1964-1969 \$210 000 was used for fellowships at the Trieste Centre.

<sup>b/</sup> The funds from voluntary contributions are supplemented by miscellaneous income accruing to the General Fund and to Operating Fund II, which explains why the amount actually made available for technical assistance exceeded the amount pledged.

Table 3

Experts (classified by place of origin) and fellowship awards  
(classified by place of study): 1977

Place of origin of experts or place of study for holders of fellowship awards	Experts			Fellowship awards					TOTAL
	UNDP	Agency	TOTAL	UNDP		Agency			
				Country	Regional	Country	Regional	Scientific visits	
Argentina	8	10	18	1	-	1	-	2	4
Australia	2	6	8	1	-	2	-	1	4
Austria	-	6	6	-	-	9	18	2	29
Bangladesh	-	1	1	-	-	-	-	-	-
Belgium	1	1	2	2	-	7	-	4	13
Brazil	-	5	5	1	-	2	4	3	10
Canada	6	12	18	4	-	8	-	5	17
Costa Rica	-	1	1	-	-	-	-	-	-
Cuba	-	-	-	-	-	-	1	-	1
Czechoslovakia	-	3	3	-	-	1	18	-	19
Denmark	1	1	2	1	-	7	-	3	11
Egypt	-	-	-	-	-	1	-	2	3
France	-	5	5	-	-	-	-	-	-
Finland	2	13	15	8	-	20	17	21	66
German Democratic Republic	-	2	2	-	-	1	18	-	19
Germany, Federal Republic of	6	27	33	4	-	22	39	27	92
Ghana	-	-	-	-	-	-	-	1	1
Greece	-	-	-	-	-	-	-	1	1
Hungary	1	5	6	-	-	4	-	5	9
India	2	14	16	-	-	4	15	5	24
Indonesia	-	-	-	-	-	-	-	1	1
Iran	-	-	-	1	-	-	-	-	1
Israel	-	2	2	-	-	2	-	1	3
Italy	-	7	7	3	-	19	16	8	46
Japan	2	4	6	1	-	3	-	5	9
Korea, Republic of	-	-	-	-	22	-	-	-	22
Liechtenstein	-	-	-	-	-	-	-	2	2
Malaysia	-	-	-	-	-	-	16	-	16
Mexico	-	2	2	-	-	3	-	1	4
Morocco	-	-	-	-	-	1	-	-	1
Netherlands	3	8	11	3	-	6	-	8	17
New Zealand	-	2	2	-	-	-	-	-	-
Nigeria	-	-	-	1	-	1	-	-	2
Norway	-	1	1	1	-	1	-	2	4
Pakistan	1	2	3	-	-	-	-	-	-
Peru	-	-	-	-	-	-	16	-	16
Philippines	-	2	2	1	-	1	-	1	3
Poland	-	6	6	-	-	4	-	1	5
Portugal	-	1	1	1	-	-	-	-	1
Romania	-	1	1	-	-	-	-	1	1
Spain	4	10	14	17	-	7	-	3	27
Sri Lanka	-	-	-	-	-	-	15	-	15
Sweden	2	7	9	4	-	10	-	2	16
Switzerland	-	4	4	1	-	4	-	3	8
Turkey	-	1	1	-	-	1	-	-	1
USSR	-	-	-	-	-	4	43	-	47
UK	14	23	37	6	-	54	16	16	92
USA	11	28	39	19	-	138	128	10	295
Yugoslavia	1	9	10	1	-	2	16	2	21
IAEA	15	68	83	12	-	15	-	8	35
Other international organizations	3	3	6	2	-	-	-	2	4
<b>TOTAL</b>	<b>85</b>	<b>303</b>	<b>388</b>	<b>96</b>	<b>22</b>	<b>365</b>	<b>396</b>	<b>159</b>	<b>1 038<sup>a/</sup></b>

a/ The difference between the number of awards (828) and the number of places of study (1038) is due to the fact that a number of fellows, study tour participants and holders of awards for scientific visits went to more than one place of study.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1968-1977  
(in thousands of dollars)

TYPE	Experts		Visiting professors		Equipment		Fellowships		Scientific visits		Intercountry projects		Sub-contracts		TOTAL		Assistance outstanding at 31 December 1977		TOTAL (8) + (9) + (10)	
															Unliquidated obligations	In kind balance <sup>2/</sup>				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)									
	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	\$	\$	
1968-1973																				
UNDP funds	4 285.4	42.9	-	-	3 152.2	31.5	907.5	9.1	-	-	1 164.4	11.6	492.0	4.9	10 001.5	100.0	-	-	10 001.5	
Agency funds	3 918.5	34.0	363.1	3.2	3 366.8	29.3	2 604.5	22.6	190.7	1.7	1 062.9	9.2	-	-	11 506.5	100.0	30.4	-	11 536.9	
Assistance in kind <sup>a/</sup>	84.6	1.7	-	-	1 146.8	22.7	3 456.5	68.5	-	-	359.7	7.1	-	-	5 047.6	100.0	-	-	5 047.6	
TOTAL	8 288.5	31.2	363.1	1.4	7 665.8	28.9	6 968.5	26.2	190.7	0.7	2 587.0	9.7	492.0	1.9	26 555.6	100.0	30.4	-	26 586.0	
1974																				
UNDP funds	906.3	29.4	-	-	1 323.2	42.9	305.3	9.9	-	-	304.0	9.9	242.8	7.9	3 081.6	100.0	-	-	3 081.6	
Agency funds	986.0	40.8	16.3	0.7	767.5	31.8	462.4	19.2	60.9	2.5	120.1	5.0	-	-	2 413.2	100.0	49.7	-	2 462.9	
Assistance in kind <sup>a/</sup>	34.1	2.7	-	-	361.9	29.0	714.2	57.3	-	-	137.5	11.0	-	-	1 247.7	100.0	-	4.2	1 251.9	
TOTAL	1 926.4	28.6	16.3	0.7	2 452.6	36.4	1 481.9	22.0	60.9	0.9	561.6	8.3	242.8	3.6	6 742.5	100.0	49.7	4.2	6 796.4	
1975																				
UNDP funds	1 568.1	39.8	-	-	1 150.4	29.2	379.9	9.6	-	-	237.5	6.0	605.6	15.4	3 941.5	100.0	-	-	3 941.5	
Agency funds	957.3	28.0	36.1	1.1	1 337.5	39.1	761.6	22.2	76.5	2.2	254.5	7.4	-	-	3 423.5	100.0	246.4	-	3 669.9	
Assistance in kind <sup>a/</sup>	48.6	4.1	-	-	254.6	21.3	747.3	62.5	-	-	144.7	12.1	-	-	1 195.2	100.0	-	64.6	1 259.8	
TOTAL	2 574.0	30.1	36.1	0.4	2 742.5	32.0	1 888.8	22.1	76.5	0.9	636.7	7.4	605.6	7.1	8 560.2	100.0	246.4	64.6	8 812.2	
1976																				
UNDP funds	1 259.6	42.0	-	-	913.6	30.4	368.5	12.3	-	-	148.0	4.9	312.6	10.4	3 002.3	100.0	-	-	3 002.3	
Agency funds	1 231.6	31.1	2.8	0.1	1 340.9	33.9	722.5	18.3	99.6	2.5	557.3	14.1	-	-	3 954.7	100.0	1 083.4	-	5 038.1	
Assistance in kind <sup>a/</sup>	84.1	6.1	-	-	400.9	29.0	836.3	60.6	-	-	59.0	4.3	-	-	1 380.3	100.0	-	373.3	1 753.6	
TOTAL	2 575.3	30.9	2.8	0.0	2 655.4	31.9	1 927.3	23.1	99.6	1.2	764.3	9.2	312.6	3.7	8 337.3	100.0	1 083.4	373.3	9 794.0	
1977																				
UNDP funds	1 005.5	46.9	-	-	720.6	33.6	237.8	11.1	-	-	22.0	1.0	158.5	7.4	2 144.4	100.0	691.9	-	2 836.3	
Agency funds	1 820.5	36.4	20.9	0.4	1 656.6	33.2	675.8	13.5	114.5	2.3	708.8	14.2	-	-	4 997.1	100.0	2 217.2	-	7 214.3	
Extrabudgetary funds	97.0	16.4	-	-	149.3	25.2	118.7	20.1	0.2	0.0	227.0	38.3	-	-	592.2	100.0	578.6	-	1 170.8	
Assistance in kind <sup>a/</sup>	16.9	1.3	-	-	273.9	21.3	924.6	72.0	3.4	0.3	65.5	5.1	-	-	1 284.3	100.0	-	1 016.5	2 300.8	
TOTAL	2 939.9	32.6	20.9	0.2	2 800.4	31.1	1 956.9	21.7	118.1	1.3	1 023.3	11.3	158.5	1.8	9 018.0	100.0	3 487.7	1 016.5	13 522.2	
1968-1977																				
UNDP funds	9 024.9	40.7	-	-	7 260.0	32.7	2 199.0	9.9	-	-	1 875.9	8.5	1 811.5	8.2	22 171.3	100.0	691.9	-	22 863.2	
Agency funds	8 913.9	33.9	439.2	1.7	8 469.3	32.2	5 226.8	19.9	542.2	2.1	2 703.6	10.2	-	-	26 295.0	100.0	3 627.1	-	29 922.1	
Extrabudgetary funds	97.0	16.4	-	-	149.3	25.2	118.7	20.1	0.2	0.0	227.0	38.3	-	-	592.2	100.0	578.6	-	1 170.8	
Assistance in kind <sup>a/</sup>	268.3	2.6	-	-	2 438.1	24.0	6 678.9	65.8	3.4	0.0	766.4	7.6	-	-	10 155.1	100.0	-	1 458.6	11 613.7	
GRAND TOTAL	18 304.1	30.9	439.2	0.8	18 316.7	30.9	14 223.4	24.0	545.8	0.9	5 572.9	9.4	1 811.5	3.1	59 213.6	100.0	4 897.6	1 458.6	65 569.8	

a/ Estimated; see Introductory Notes, paras 4 and 5, to this Annex.

Table 5A

Status of monetary resources and expenditures for the Agency's  
regular programme of technical assistance  
as at 31 December 1977  
(in thousands of dollars)

Pro- gramme year	Monetary re- sources made available	Year of expenditure											Total ex- penditures 1958- 1977	Unliqui- dated obli- gations	Unobligated ear- markings	Pro- gramme savings (deficit)
		1958-1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977				
1958-1967	10 323	8 310	547	344	173	75	26	3	-	-	-	-	9 478	-	-	845
1968	1 348	-	406	712	216	126	23	7	-	-	-	-	1 490	-	-	(142)
1969	1 586	-	-	522	606	243	125	7	1	2	-	-	1 506	-	-	80
1970	1 749	-	-	-	624	775	405	144	23	23	3	1	1 998	-	-	(249)
1971	2 224	-	-	-	-	905	1 144	364	82	32	22	31	2 580	-	-	(356)
1972	2 636	-	-	-	-	-	833	1 193	458	167	70	38	2 759	2	35	(160)
1973	3 124	-	-	-	-	-	-	958	1 114	616	229	102	3 019	29	63	13
1974	3 348	-	-	-	-	-	-	-	735	1 373	657	287	3 052	50	298	(52)
1975	4 540	-	-	-	-	-	-	-	-	1 211	1 474	850	3 535	246	671	88
1976	5 474	-	-	-	-	-	-	-	-	-	1 500	1 917	3 417	1 083	1 059	(85)
1977	5 866	-	-	-	-	-	-	-	-	-	-	1 771	1 771	2 217	1 884	(6)
TOTAL	42 218	8 310	953	1 578	1 619	2 124	2 556	2 676	2 413	3 424	3 955	4 997	34 605	3 627	4 010	(24) <sup>a/</sup>

<sup>a/</sup> The \$24 000 overall programme deficit is the difference between the unobligated balance in Operating Fund II of \$3 986 000 (see Statement III.A of the Agency's accounts for 1977) and total earmarkings of \$4 010 000 (amounts which have not yet been obligated but are needed for approved projects).

Table 5B

Status of extrabudgetary funds and expenditures for the Agency's  
technical assistance activities as at 31 December 1977  
(in thousands of dollars)

Pro- gramme year	Extra- budgetary funds made available	Year of expenditure											Total ex- penditures 1958- 1977	Unliqui- dated obli- gations	Unobli- gated balance
		1958- 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977			
1958- 1967	134	37	13	10	37	20	17	-	-	-	-	-	134	-	-
1968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1969	13	-	-	3	9	-	1	-	-	-	-	-	13	-	-
1970	61	-	-	-	30	23	8	-	-	-	-	-	61	-	-
1971	218	-	-	-	-	17	49	8	22	18	9	22	145	4	69
1972	60	-	-	-	-	-	10	26	7	-	-	-	43	-	17
1973	267	-	-	-	-	-	-	53	79	96	4	19	251	-	16
1974	369	-	-	-	-	-	-	-	63	102	173	31	369	-	-
1975	108	-	-	-	-	-	-	-	-	37	10	59	106	-	2
1976	661	-	-	-	-	-	-	-	-	-	209	213	422	114	125
1977	1 944	-	-	-	-	-	-	-	-	-	-	263	263	461	1 220
TOTAL	3 835	37	13	13	76	60	85	87	171	253	405	607	1 807 <sup>a/</sup>	579	1 449

a/ Includes \$62 000 in programme support costs paid by SIDA (\$45 784 in 1976 and \$16 467 in 1977).



Table 6

## Recipients of expert services and fellowship awards: 1977

RECIPIENT	Number of expert assignments, classified by location of duty station						Number of fellowship awards, classified by nationality of award holder					
	UNDP		Agency		TOTAL		UNDP		Agency		TOTAL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Afghanistan	-	-	3	16	3	16	-	-	-	-	-	-
Argentina	4	19	18	33	22	52	2	13	15	153	17	166
Bangladesh	-	-	7	24	7	24	-	-	15	137	15	137
Bolivia	-	-	1	3	1	3	-	-	1	12	1	12
Brazil	14	34	8	31	22	65	8	24	4	48	12	72
Bulgaria	-	-	2	3	2	3	-	-	7	81	7	81
Burma	-	-	2	11	2	11	-	-	3	30	3	30
Chile	14	55	7	12	21	67	17	109	1	12	18	121
Colombia	-	-	2	10	2	10	-	-	3	20	3	20
Costa Rica	-	-	3	18	3	18	-	-	2	15	2	15
Cuba	5	2	-	-	5	2	-	-	2	19	2	19
Cyprus	-	-	-	-	-	-	-	-	3	7	3	7
Czechoslovakia	-	-	-	-	-	-	1	2	13	115	14	117
Ecuador	-	-	4	10	4	10	-	-	-	-	-	-
Egypt	4	3	-	-	4	3	2	4	14	159	16	163
Ethiopia	-	-	4	17	4	17	-	-	2	3	2	3
Ghana	-	-	3	3	3	3	1	6	10	118	11	124
Greece	3	25	4	2	7	27	1	2	13	118	14	120
Guatemala	-	-	1	1	1	1	-	-	-	-	-	-
Hungary	-	-	1	1	1	1	-	-	10	82	10	82
Iceland	-	-	1	1	1	1	-	-	-	-	-	-
India	-	-	3	3	3	3	-	-	20	198	20	198
Indonesia	1	2	5	31	6	33	-	-	4	25	4	25
Iran	-	-	5	8	5	8	-	-	1	6	1	8
Iraq	-	-	1	3	1	3	-	-	3	15	3	15
Israel	-	-	3	3	3	3	-	-	6	44	6	44
Ivory Coast	-	-	2	3	2	3	-	-	-	-	-	-
Jamaica	-	-	2	7	2	7	-	-	2	4	2	4
Jordan	-	-	1	12	1	12	-	-	3	36	3	36
Kenya	-	-	-	-	-	-	-	-	2	24	2	24
Korea, Republic of	-	-	10	35	10	35	1	2	15	168	16	170
Kuwait	-	-	1	1	1	1	-	-	-	-	-	-
Libyan Arab Jamahiriya	-	-	2	15	2	15	-	-	7	75	7	75
Madagascar	-	-	2	14	2	14	-	-	1	4	1	4
Malaysia	-	-	11	14	11	14	-	-	10	91	10	91
Mali	-	-	1	12	1	12	-	-	-	-	-	-
Mexico	-	-	13	37	13	37	-	-	-	-	-	-
Mongolia	-	-	1	1	1	1	-	-	-	-	-	-
Morocco	8	20	3	13	11	33	-	-	7	21	7	21
Niger	-	-	1	1	1	1	-	-	-	-	-	-
Nigeria	2	18	1	1	3	19	-	-	9	108	9	108
Pakistan	4	21	1	1	5	22	5	21	23	235	28	256
Panama	-	-	3	8	3	8	-	-	-	-	-	-
Paraguay	-	-	1	1	1	1	-	-	1	12	1	12
Peru	3	19	7	19	10	38	-	-	5	48	5	48
Philippines	-	-	5	17	5	17	2	10	19	174	21	184
Poland	-	-	1	1	1	1	-	-	7	60	7	60
Portugal	-	-	5	3	5	3	-	-	5	13	5	13
Romania	3	2	-	-	3	2	10	11	-	-	10	11
Senegal	-	-	3	3	3	3	-	-	-	-	-	-
Singapore	-	-	1	4	1	4	-	-	-	-	-	-
Spain	-	-	2	7	2	7	-	-	-	-	-	-
Sri Lanka	-	-	6	17	6	17	-	-	18	163	18	163
Sudan	2	6	1	9	3	15	-	-	8	70	8	70
Syrian Arab Republic	3	2	1	1	4	3	1	2	3	25	4	27
Thailand	-	-	7	21	7	21	-	-	10	120	10	120
Tunisia	-	-	1	9	1	9	-	-	-	-	-	-
Turkey	3	18	7	3	10	21	4	16	23	217	27	233
Uganda	-	-	1	3	1	3	-	-	1	12	1	12
United Republic of Tanzania	-	-	1	1	1	1	-	-	-	-	-	-
Uruguay	-	-	3	3	3	3	-	-	-	-	-	-
Venezuela	-	-	2	2	2	2	-	-	1	6	1	6
Yugoslavia	4	3	2	2	6	5	4	5	11	75	15	80
Zaire	-	-	2	5	2	5	-	-	5	51	5	51
Zambia	-	-	3	17	3	17	-	-	-	-	-	-
Sub-total	77	249	205	567	282	816	59	227	348	3 249	407	3 476
Inter-country programmes:												
Short-term training projects	14	3	158	57	172	60	22	8	342	728	364	736
Scientific visits	-	-	-	-	-	-	-	-	57	53	57	53
Sub-total	14	3	158	57	172	60	22	8	399	781	421	789
GRAND TOTAL	91	252	363	624	454 <sup>a/</sup>	876	81	235	747	4 030	828	4 265

(1) Number.

(2) Number of man-months.

a/ The difference between the number of assignments (454) and the number of experts (388) is due to the fact that a number of experts served in more than one country.

Table 7

Financial summary: 1977  
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1977		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP	Agency	Extra- budgetary funds <sup>a/</sup>	In kind <sup>b/</sup>	TOTAL	Unliqui- dated obli- gations	In kind balance	
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)	(10)	
<i>Country programmes:</i>												
Afghanistan	50,8	20,1	3,7	74,6	-	74,6	-	-	74,6	46,5	-	121,1
Albania	-	52,6	-	52,6	1,3	51,3	-	-	52,6	-	-	52,6
Algeria	7,0	-	-	7,0	-	7,0	-	-	7,0	-	-	7,0
Argentina	207,5	118,1	70,9	396,5	144,9	241,0	-	10,6	396,5	88,5	46,8	531,8
Bangladesh	22,8	39,6	84,0	146,4	-	95,1	10,3	41,0	146,4	67,9	49,5	263,8
Bolivia	2,3	16,9	10,7	29,9	-	21,6	1,9	6,4	29,9	23,2	-	53,1
Brazil	226,5	110,0	59,0	395,5	271,0	98,5	-	26,0	395,5	89,7	24,6	509,8
Bulgaria	8,0	72,9	61,1	142,0	-	114,5	-	27,5	142,0	65,9	11,3	219,2
Burma	34,1	23,4	9,9	67,4	0,6	66,1	-	0,7	67,4	26,0	5,1	98,5
Chile	284,9	255,2	91,0	631,1	493,7	116,5	-	20,9	631,1	101,3	12,3	744,7
Colombia	30,4	4,8	13,8	49,0	-	41,5	-	7,5	49,0	8,4	21,0	78,4
Costa Rica	60,2	55,9	22,9	139,0	-	95,0	-	44,0	139,0	61,8	4,3	205,1
Cuba	17,0	73,4	6,8	97,2	29,0	61,4	3,6	5,2	97,2	103,8	-	201,0
Cyprus	-	1,6	5,3	6,9	-	6,9	-	-	6,9	0,1	12,0	19,0
Czechoslovakia	-	-	41,4	41,4	1,4	12,9	-	27,1	41,4	52,2	18,5	112,1
Ecuador	49,3	43,0	(0,1)	92,2	-	51,0	13,0	28,2	92,2	76,5	7,0	175,7
Egypt	12,7	82,9	84,0	179,6	51,9	67,0	4,9	55,8	179,6	414,6	73,3	667,5
El Salvador	-	12,6	-	12,6	-	-	-	12,6	12,6	7,0	-	19,6
Ethiopia	49,3	13,5	5,9	68,7	-	68,1	-	0,6	68,7	7,1	-	75,8
Ghana	10,8	39,5	87,9	138,2	6,3	74,6	4,5	52,8	138,2	111,4	76,1	325,7
Greece	103,0	61,8	52,1	216,9	95,7	66,8	19,9	34,5	216,9	29,0	50,6	296,5
Guatemala	3,7	30,4	-	34,1	-	6,9	5,5	21,7	34,1	13,2	-	47,3
Hong Kong	1,8	-	8,4	10,2	-	1,8	-	6,4	10,2	-	-	12,0
Hungary	6,6	113,0	50,5	170,1	79,7	83,2	-	7,2	170,1	205,2	13,7	389,0
Iceland	1,5	65,1	0,9	67,5	-	66,8	-	0,9	67,5	7,8	-	75,3
India	6,8	1,9	177,9	186,6	5,9	118,3	5,2	57,2	186,6	131,8	64,2	382,6
Indonesia	113,7	53,6	34,4	201,7	15,7	154,9	13,6	17,5	201,7	40,6	20,3	262,6
Iran	27,9	-	3,7	31,6	-	31,6	-	-	31,6	0,4	2,0	34,0
Iraq	11,4	229,7	30,0	271,1	-	248,5	8,0	14,6	271,1	157,8	10,0	438,9
Israel	9,4	38,2	26,9	74,5	5,2	46,5	-	22,8	74,5	40,7	35,0	150,2
Ivory Coast	15,0	11,0	-	26,0	-	26,0	-	-	26,0	23,8	-	49,8
Jamaica	26,5	-	3,6	30,1	-	30,1	-	-	30,1	-	-	30,1
Jordan	40,4	4,5	7,9	52,8	-	44,9	-	7,9	52,8	73,7	17,2	143,7
Kenya	2,7	0,8	14,0	17,5	-	17,1	-	0,4	17,5	7,9	9,3	34,7
Korea, Republic of	126,0	24,4	65,9	216,3	13,7	143,0	-	59,6	216,3	46,6	150,6	413,5
Kuwait	3,0	-	-	3,0	-	3,0	-	-	3,0	-	-	3,0
Libyan Arab Jamahiriya	49,5	13,0	6,2	68,7	-	63,6	-	5,1	68,7	16,8	39,9	125,2
Madagascar	37,7	45,5	3,2	86,4	-	86,4	-	-	86,4	15,0	-	101,4
Malaysia	54,5	52,3	29,9	136,7	-	53,8	1,2	81,7	136,7	42,7	22,0	201,4
Mali	49,1	12,9	-	62,0	-	62,0	-	-	62,0	19,7	-	81,7
Mexico	113,0	-	14,5	127,5	-	116,9	2,8	7,8	127,5	70,1	5,0	202,6
Mongolia	8,4	71,6	7,0	85,0	-	78,0	7,0	-	85,0	71,0	-	156,0
Morocco	106,8	97,7	16,5	221,0	176,6	11,9	26,1	6,4	221,0	23,8	3,9	248,7
Niger	2,3	-	-	2,3	-	2,3	-	-	2,3	0,6	-	2,9
Nigeria	71,4	1,9	16,3	89,6	84,0	15,4	6,5	3,7	89,6	16,9	65,8	172,3
Pakistan	94,3	35,1	139,2	268,6	140,3	78,4	5,9	44,0	268,6	286,6	110,6	665,8
Panama	26,4	0,5	-	26,9	-	26,9	-	-	26,9	1,6	-	28,5
Paraguay	0,9	19,8	3,6	24,3	-	4,5	19,8	-	24,3	17,2	2,8	44,3
Peru	159,3	56,2	28,8	243,3	101,8	116,0	-	25,7	243,3	98,0	59,2	410,5
Philippines	72,2	106,0	107,5	285,7	4,9	124,6	21,3	134,9	285,7	159,5	124,9	570,1
Poland	4,9	1,0	84,6	90,5	-	64,0	-	26,5	90,5	21,9	6,9	119,3
Portugal	8,4	24,1	9,8	42,3	-	42,3	-	-	42,3	7,9	3,5	53,7
Romania	36,4	98,7	8,4	143,5	59,7	83,8	-	-	143,5	324,1	-	467,6
Senegal	8,8	14,4	4,0	27,2	-	23,2	-	4,0	27,2	28,4	1,1	56,7
Sierra Leone	-	-	0,1	0,1	-	0,1	-	-	0,1	-	-	0,1
Singapore	14,9	52,1	5,7	72,7	-	67,0	-	5,7	72,7	52,9	-	125,6
Spain	24,4	-	-	24,4	-	24,4	-	-	24,4	59,6	-	84,0
Sri Lanka	52,6	42,4	57,3	152,3	2,2	122,1	5,0	23,0	152,3	50,0	51,8	254,1
Sudan	49,5	30,6	60,1	140,2	19,9	85,0	17,3	20,0	140,2	70,8	11,3	222,3
Syrian Arab Republic	10,3	35,7	27,3	73,3	36,8	35,2	1,3	-	73,3	22,6	7,0	102,9
Thailand	71,9	17,3	73,7	162,9	-	86,4	11,6	64,9	162,9	128,6	73,5	365,0
Tunisia	31,1	16,3	-	47,4	-	47,4	-	-	47,4	-	-	47,4
Turkey	63,3	29,2	129,6	222,3	106,9	48,5	-	66,9	222,3	56,0	79,9	358,2
Uganda	12,3	13,8	6,6	32,7	-	32,7	-	-	32,7	59,3	-	92,0
United Republic of Cameroon	-	-	5,2	5,2	-	5,2	-	-	5,2	-	-	5,2
United Republic of Tanzania	1,3	-	-	1,3	-	1,3	-	-	1,3	24,8	-	26,1
Uruguay	10,3	117,6	2,8	130,7	0,2	62,5	20,9	47,1	130,7	16,1	-	146,8
Venezuela	13,0	-	9,3	22,3	-	14,1	-	8,2	22,3	39,1	-	61,4
Yugoslavia	25,6	179,8	58,5	263,9	193,3	40,8	10,3	19,5	263,9	143,6	17,6	425,1
Zaire	19,9	9,1	10,0	39,0	-	29,6	1,3	8,1	39,0	14,8	19,1	72,9
Zambia	49,3	0,5	0,1	49,9	-	49,8	0,1	-	49,9	6,6	8,1	64,6
<b>Sub-total</b>	<b>2 924,0</b>	<b>2 865,5</b>	<b>2 058,4</b>	<b>7 847,9</b>	<b>2 122,4</b>	<b>4 257,9</b>	<b>248,8</b>	<b>1 218,6</b>	<b>7 847,9</b>	<b>4 098,8</b>	<b>1 456,6</b>	<b>13 403,3</b>

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1977		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP	Agency	Extra- budgetary funds <sup>a/</sup>	In kind <sup>b/</sup>	TOTAL	Unliqui- dated obli- gations	In kind balance	
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)	(10)	
<u>Intercountry programmes:</u>												
Asia and the Pacific	28.3	8.9	28.4	65.6	22.0	31.0	1.2	11.4	65.6	49.1	-	114.7
Latin America	45.8	43.6	37.0	126.4	-	17.4	98.4	12.6	126.4	2.4	-	128.8
Interregional	203.1	64.7	563.5	831.3	-	660.4	129.4	41.5	831.3	671.6	-	1 502.9
Sub-total	277.2	117.2	628.9	1 023.3	22.0	708.8	227.0	65.5	1 023.3	723.1	-	1 746.4
<u>SIDA large-scale assistance</u>												
Bangladesh	56.3	44.6	15.5	116.4	-	-	116.4	-	116.4	75.7	-	192.1
Miscellaneous	7.9	21.4	1.1	30.4	-	30.4	-	-	30.4	2.0	-	32.4
GRAND TOTAL	3 265.4	3 048.7	2 703.9	9 018.0	2 144.4	4 997.1	592.2	1 284.3	9 018.0	4 897.6	1 458.6	15 374.2

a/ In previous years the assistance provided from extrabudgetary funds administered by the Agency was included under assistance in kind.

b/ Assistance in kind can only be estimated; see Introductory Notes, paras 4 and 5, to this Annex.

Table 8

Financial summary 1958-1977  
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1977		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP	Agency	Extra- budgetary funds <sup>a/</sup>	In kind <sup>b/</sup>	TOTAL	Unliqui- dated obli- gations	In kind balance	
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)	(10)	
<b>Country programmes:</b>												
Afghanistan	144.7	100.8	68.7	314.2	92.9	164.2	-	57.1	314.2	46.5	-	360.7
Albania	24.0	216.6	27.3	267.9	104.0	149.4	-	14.5	267.9	-	-	267.9
Algeria	24.8	-	75.1	99.9	21.7	68.1	-	10.1	99.9	-	-	99.9
Argentina	1 152.7	704.8	775.9	2 633.4	1 092.7	1 139.3	-	401.4	2 633.4	88.5	46.8	2 768.7
Austria	62.0	13.8	120.7	196.5	-	132.6	-	63.9	196.5	-	-	196.5
Bangladesh	58.9	150.5	329.1	538.5	-	313.1	10.3	215.1	538.5	67.9	49.5	655.9
Bolivia	150.3	195.5	146.6	492.4	153.4	244.7	1.9	92.4	492.4	23.2	-	515.6
Brazil	1 865.7	908.8	827.1	3 601.6	2 187.4	1 040.2	-	374.0	3 601.6	89.7	24.6	3 715.9
Bulgaria	39.7	327.4	617.3	984.4	74.1	627.6	-	282.7	984.4	85.9	11.3	1 081.6
Burma	591.9	374.0	149.0	1 114.9	537.0	498.9	-	79.0	1 114.9	26.0	5.1	1 146.0
Chile	1 167.1	834.0	446.4	2 447.5	1 667.9	592.0	-	187.6	2 447.5	101.3	12.3	2 561.1
China, Republic of	229.7	166.2	554.9	950.8	281.5	307.7	-	361.6	950.8	-	-	950.8
Colombia	325.2	331.0	213.0	869.2	132.0	441.1	-	296.1	869.2	8.4	21.0	898.6
Costa Rica	141.2	128.9	66.7	336.8	-	227.6	-	109.2	336.8	61.8	4.3	402.9
Cuba	129.6	381.8	56.6	568.0	46.5	465.6	3.6	52.3	568.0	103.8	-	671.8
Cyprus	70.6	117.6	43.3	231.5	24.1	171.6	-	35.8	231.5	0.1	12.0	243.6
Czechoslovakia	-	-	556.3	556.3	6.2	294.2	-	255.9	556.3	52.2	18.5	627.0
Democratic Kampuchea	85.0	29.3	1.7	116.0	39.1	69.6	-	7.3	116.0	-	-	116.0
Dominican Republic	-	-	2.8	2.8	-	-	-	2.8	2.8	-	-	2.8
Ecuador	108.0	150.8	72.6	331.4	35.5	181.8	13.0	101.1	331.4	76.5	7.0	414.9
Egypt	421.6	831.0	1 079.7	2 332.3	686.5	937.8	4.9	703.1	2 332.3	414.6	73.3	2 820.2
El Salvador	41.1	50.5	22.3	113.9	14.1	30.1	-	89.7	113.9	7.0	-	120.9
Ethiopia	159.7	75.7	56.2	291.6	73.2	185.1	-	33.3	291.6	7.1	-	298.7
Gabon	3.7	-	-	3.7	-	3.7	-	-	3.7	-	-	3.7
Ghana	314.3	326.5	361.3	1 002.1	227.0	558.7	4.5	211.9	1 002.1	111.4	76.1	1 189.6
Greece	1 511.6	376.4	694.1	2 582.1	1 359.2	811.3	19.9	391.5	2 582.1	29.0	50.6	2 661.7
Guatemala	69.2	122.2	35.8	227.2	56.2	80.5	5.5	85.0	227.2	13.2	-	240.4
Haiti	0.9	-	-	0.9	-	0.9	-	-	0.9	-	-	0.9
Hong Kong	53.6	96.9	20.6	171.1	-	162.1	-	9.0	171.1	-	-	171.1
Hungary	85.1	1 004.9	708.9	1 798.9	593.0	963.9	-	242.0	1 798.9	205.2	13.7	2 017.8
Iceland	31.7	173.5	41.6	246.8	-	183.7	-	63.1	246.8	7.8	-	254.6
India	804.7	1 934.6	1 646.3	4 385.6	2 636.5	941.6	5.2	802.3	4 385.6	131.8	64.2	4 581.6
Indonesia	797.0	502.3	734.5	2 033.8	465.6	1 044.8	13.6	509.8	2 033.8	40.6	20.3	2 094.7
Iran	629.2	72.0	421.5	1 122.7	455.4	411.7	-	255.6	1 122.7	0.4	2.0	1 125.1
Iraq	357.7	480.8	606.1	1 444.6	242.5	871.4	8.0	322.7	1 444.6	157.8	10.0	1 612.4
Israel	238.9	545.8	294.5	1 079.2	170.9	621.5	-	286.8	1 079.2	40.7	35.0	1 154.9
Ivory Coast	79.2	44.2	2.9	126.3	73.4	52.9	-	-	126.3	23.8	-	150.1
Jamaica	100.0	74.2	24.0	198.2	10.4	117.0	-	70.8	198.2	-	-	198.2
Japan	50.1	-	322.3	372.4	49.8	129.4	-	193.2	372.4	-	-	372.4
Jordan	168.5	61.8	82.0	312.3	89.3	199.3	-	23.1	312.3	73.7	17.2	403.2
Kenya	87.7	115.0	52.2	254.9	27.4	155.1	-	72.4	254.9	7.9	9.3	272.1
Korea, Republic of	674.9	604.9	996.8	2 276.6	566.8	1 036.6	-	673.2	2 276.6	46.6	150.6	2 473.8
Kuwait	12.0	-	3.9	15.9	-	15.9	-	-	15.9	-	-	15.9
Lebanon	247.8	140.7	65.3	453.8	139.3	291.3	-	23.2	453.8	-	-	453.8
Liberia	115.2	29.0	-	144.2	60.2	27.7	-	56.3	144.2	-	-	144.2
Libyan Arab Jamahiriya	71.0	53.5	6.2	130.7	-	125.6	-	5.1	130.7	16.6	39.9	187.2
Madagascar	78.8	69.8	24.7	173.3	-	173.3	-	-	173.3	15.0	-	188.3
Malaysia	135.0	105.2	130.7	370.9	1.6	229.9	1.2	138.2	370.9	42.7	22.0	435.6
Mali	187.8	44.5	2.2	234.5	13.4	219.4	-	1.7	234.5	19.7	-	254.2
Mauritius	3.3	-	-	3.3	-	3.3	-	-	3.3	-	-	3.3
Mexico	855.7	280.8	298.4	1 434.9	419.3	835.1	2.8	177.7	1 434.9	70.1	5.0	1 510.0
Mongolia	22.7	105.5	8.0	136.2	-	128.2	7.0	1.0	136.2	71.0	-	207.2
Morocco	645.2	490.3	162.6	1 298.1	651.8	476.5	26.1	143.7	1 298.1	23.8	3.9	1 325.8
Nicaragua	13.9	7.6	20.1	41.6	-	41.6	-	-	41.6	-	-	41.6
Niger	2.3	-	-	2.3	-	2.3	-	-	2.3	0.6	-	2.9
Nigeria	438.7	154.7	114.0	717.4	254.1	389.0	6.5	69.8	717.4	16.9	65.8	800.1
Pakistan	1 274.8	1 115.0	976.7	3 366.5	1 742.8	1 066.9	5.9	550.9	3 366.5	286.6	110.6	3 763.7
Panama	65.1	11.1	29.0	105.2	4.1	72.1	-	29.0	105.2	1.6	-	106.8
Paraguay	11.2	24.4	35.7	71.3	-	35.8	19.8	15.7	71.3	17.2	2.8	91.3
Peru	492.3	306.6	142.1	941.0	218.0	505.3	-	217.7	941.0	98.0	69.2	1 108.2
Philippines	578.7	1 000.3	1 206.7	2 785.7	901.8	958.9	21.3	903.7	2 785.7	159.5	124.9	3 070.1
Poland	32.4	338.4	995.6	1 366.4	199.7	818.5	-	348.2	1 366.4	21.9	6.9	1 395.2
Portugal	65.9	70.0	47.5	183.4	-	131.2	-	52.2	183.4	7.9	3.5	194.8
Romania	392.1	1 169.7	647.6	2 209.6	1 294.2	719.7	-	195.7	2 209.6	324.1	-	2 533.7
Saudi Arabia	18.6	2.9	10.5	32.2	-	25.2	-	7.0	32.2	-	-	32.2
Senegal	124.6	181.5	23.5	309.6	86.5	209.7	-	13.4	309.6	28.4	1.1	339.1
Sierra Leone	212.3	53.4	36.4	302.1	174.5	58.8	-	68.8	302.1	-	-	302.1
Singapore	127.7	216.8	44.4	388.9	-	336.1	-	52.8	388.9	52.9	-	441.8
Somalia	6.3	-	-	6.3	6.3	-	-	-	6.3	-	-	6.3
Spain	25.1	-	61.1	86.2	-	63.1	-	23.1	86.2	58.6	-	145.8
Sri Lanka	352.9	367.3	196.3	916.5	124.6	644.9	5.0	142.0	916.5	50.0	51.8	1 018.3
Sudan	359.2	262.1	308.6	929.9	290.2	557.0	17.3	85.4	929.9	70.8	11.3	1 032.0
Syrian Arab Republic	97.3	198.6	207.3	503.2	185.1	247.0	1.3	69.8	503.2	22.6	7.0	532.8
Thailand	919.0	414.5	1 082.9	2 415.4	845.5	1 112.2	11.6	746.1	2 415.4	126.6	73.5	2 615.5
Tunisia	288.0	153.0	149.3	590.3	141.2	382.9	-	66.2	590.3	-	-	590.3

RECIPIENT	Assistance provided, by type				Assistance provided, by source				Assistance outstanding at 31 December 1977		TOTAL (8) + (9) + (10)	
	Experts	Equip-ment	Fellow-ships	TOTAL	UNDP	Agency	Extra-budgetary funds <sup>a/</sup>	In kind <sup>b/</sup>	TOTAL	Unliqui-dated obli-gations		In kind balance
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)		(10)
Turkey	1 163,5	909,8	926,0	2 999,3	1 594,8	832,5	-	572,0	2 999,3	56,0	79,9	3 135,2
Uganda	208,6	125,6	29,0	363,2	131,0	225,1	-	7,1	363,2	59,3	-	422,5
United Republic of Cameroon	282,5	97,9	44,2	424,6	297,3	120,5	-	6,8	424,6	-	-	424,6
United Republic of Tanzania	8,1	-	2,8	10,9	9,6	1,3	-	-	10,9	24,8	-	35,7
Uruguay	180,3	485,2	106,4	771,9	173,6	393,0	20,9	184,4	771,9	16,1	-	788,0
Venezuela	272,8	95,4	214,8	584,0	130,7	271,8	-	181,5	584,0	39,1	-	623,1
Viet Nam	74,4	143,8	141,6	359,8	31,4	173,2	-	155,2	359,8	-	-	359,8
Yugoslavia	478,1	1 087,2	994,2	2 559,5	1 501,1	722,6	10,3	325,5	2 559,5	143,6	17,6	2 720,7
Zaire	272,5	119,3	153,5	545,3	9,6	438,4	1,3	106,0	545,3	14,8	19,1	579,2
Zambia	293,6	79,5	29,1	402,2	152,5	225,2	0,1	24,4	402,2	6,6	8,1	416,9
Other countries <sup>c/</sup>	24,6	19,4	456,3	500,3	27,2	247,2	-	225,9	500,3	-	-	500,3
Sub-total	24 582,6	23 166,3	23 490,1	71 239,0	25 806,2	31 173,4	248,8	14 010,6	71 239,0	4 096,8	1 458,6	76 794,4
<b>Inter-country programmes.</b>												
Africa	124,1	77,4	98,8	300,3	289,7	5,7	-	4,9	300,3	-	-	300,3
Asia and the Pacific	438,3	125,5	310,5	874,3	604,9	182,2	1,2	86,0	874,3	49,1	-	923,4
Europe	21,0	18,8	17,3	56,9	56,9	-	-	-	56,9	-	-	56,9
Latin America	721,3	732,8	202,8	1 656,9	1 458,2	54,0	96,4	48,3	1 656,9	2,4	-	1 659,3
Middle East	5,8	1,2	5,3	12,3	12,3	-	-	-	12,3	-	-	12,3
Interregional	1 177,2	507,0	3 561,1	5 245,3	1 441,0	3 031,4	129,4	643,5	5 245,3	671,6	-	5 916,9
Sub-total	2 487,7	1 462,5	4 195,8	8 146,0	3 863,0	3 273,3	227,0	782,7	8 146,0	723,1	-	8 869,1
<b>SIDA large-scale assistance</b>												
Bangladesh	120,8	298,6	49,0	468,4	-	-	116,4	352,0	468,4	75,7	-	544,1
Miscellaneous	127,1	50,3	3,7	181,1	23,2	157,9	-	-	181,1	2,0	-	183,1
GRAND TOTAL	27 318,2	24 977,7	27 738,6	80 034,5	29 892,4	34 604,5	592,2	15 145,3	80 034,5	4 897,6	1 458,6	86 390,7

a/ For 1977 only, the assistance provided from extrabudgetary funds in previous years is included under assistance in kind.

b/ Assistance in kind can only be estimated; see Introductory Notes, paras 4 and 5, to this Annex.

c/ Includes the following countries which have not received technical assistance during the last ten or more years: Denmark, Finland, France, Germany, F.R., Italy, Monaco, Netherlands, New Zealand, Norway, Rhodesia, South Africa, Sweden, Switzerland and the United States.

## ANNEX II

EXTRABUDGETARY ASSISTANCE FOR AGENCY  
TECHNICAL CO-OPERATION PROGRAMMESA. Assistance provided from special cash contributions

Donor	Assistance made available	Expenditure \$
Canada	One expert	2 100
Netherlands	One associate expert	26 100
Sweden	Four experts, equipment for a project in one country, training for 28 fellows (147 man-months), defrayal of the cost of three training courses and the subsistence expenses of one scientific visitor	385 300
USSR	Training for six fellows (36 man-months)	21 500
USA	Three experts, equipment for ten projects in eight countries and a contribution towards meeting the cost of three training courses	157 200
TOTAL	Eight experts, one associate expert, equipment for 11 projects in 9 countries, contributions towards meeting the cost of six training courses and one scientific visitor and training for 34 fellows (183 man-months)	592 200

B. Assistance provided from funds made available by Member States to finance assistance for themselves

Source of funds	Assistance made available	Expenditure \$
Brazil	One expert	24 600
Iraq	Training for two fellows	11 100
TOTAL		35 700

C. Estimated value of the assistance in kind made available to the Agency in 1977

Donor	Assistance made available	Value \$
Argentina	Three experts, three lecturers, a contribution towards the cost of two scientific visitors and training for one Type II fellow (6 man-months)	11 500
Austria	Training for two Type II fellows (21½ man-months)	13 700
Australia	One lecturer	900
Belgium	Training for three Type II fellows (23 man-months)	10 600
Brazil	Five lecturers, a contribution towards meeting the cost of two scientific visitors and training for eight Type II fellows (44½ man-months)	27 900
Canada	Six lecturers	5 800
Costa Rica	One lecturer	900
Czechoslovakia	Two lecturers and training for two Type II fellows (11 man-months)	5 200
Denmark	One lecturer and training for six Type II fellows (32½ man-months)	17 000
Finland	One lecturer and training for one Type II fellow (10 man-months)	6 500
France	Four lecturers and training for 21 Type II fellows (133½ man-months)	66 400
German D.R.	Two lecturers	2 800
Germany, F.R.	Six lecturers and training for 12 Type II fellows (79½ man-months)	76 700
Hungary	Defrayal of the subsistence cost of one scientific visitor and training for four Type II fellows (16 man-months)	5 300
India	Three lecturers, defrayal of the subsistence cost of one scientific visitor and training for five Type II fellows (47½ man-months)	10 300
Italy	One lecturer and training for 33 Type II fellows (226½ man-months)	71 600
Israel	Training for one Type II fellow (2 man-months)	600
Japan	Two lecturers and training for five Type II fellows (33½ man-months)	22 800

Donor	Assistance made available	Value \$
Mexico	Two lecturers	1 500
Netherlands	One expert, one lecturer and training for six Type II fellows (27½ man-months)	16 300
Pakistan	Three lecturers	2 100
Philippines	One lecturer and training for one Type II fellow (6½ man-months)	1 500
Poland	Training for six Type II fellows (39 man-months)	12 800
Romania	Training for one Type II fellow (2 man-months)	600
Spain	Four lecturers and training for six Type II fellows (24½ man-months)	12 200
Switzerland	One lecturer	1 000
UK	Two lecturers and training for seven Type II fellows (44 man-months)	20 700
USA	One expert, six lecturers, equipment for 15 projects in ten countries and training for 136 Type II fellows (765 man-months)	855 300
Yugoslavia	Training for two Type II fellows (11½ man-months)	2 300
International organizations	Three lecturers	1 500
TOTAL	Five experts, 61 lecturers, contributions towards meeting the cost of five scientific visitors, equipment for 15 projects in ten countries and training for 263 Type II fellows (1607 man-months)	1 284 300



ANNEX III

INTERCOUNTRY PROJECTS: 1977

Project title	Places and dates	Source of funds	Participation <sup>a/</sup>		
			(1)	(2)	(3)
Interregional training course on nuclear power plant construction and operation management (Phase II)	Argonne, Illinois 18 January to 29 April	Regular programme	35	-	-
Interregional training course on the use of nuclear techniques for the study of chemical residue and pollution problems	Colombo, Sri Lanka 1 to 29 March	SIDA	15	-	11
Interregional training course on nuclear power plant construction and operation management (Phase II)	Saclay, France 29 March to 8 July	Regular programme	17	-	-
Interregional training course on the use, design and maintenance of nuclear and related electronic equipment	Turin, Italy 18 April to 15 July	Regular programme	16	2	-
Regional workshop on nuclear law	Rio de Janeiro, Brazil 27 June to 1 July	Regular programme	4	6	18
Interregional training course on the use of nuclear techniques in animal production	Lima, Peru 27 June to 22 July	SIDA	16	-	6
Interregional training course on the use of isotopes and radiation in entomology with special reference to pest management and the sterile-insect technique	Gainesville, Florida 11 July to 19 August	Regular programme and Government of the United States of America	17	1	-
Interregional training course on occupational and environmental safety in the utilization of radioactive material	Boston, Massachusetts 11 July to 5 August	Regular programme and Government of the United States of America	20	1	-
Interregional training course on the preparation, control and utilization of radio-pharmaceuticals	Los Angeles, California 18 July to 12 August	Regular programme and Government of the United States of America	20	-	-

Project title	Places and dates	Source of funds	Participation <sup>a/</sup>		
			(1)	(2)	(3)
Interregional training course on the application of nuclear techniques in agriculture	Moscow, Soviet Union 1 September to 1 December	Regular programme	25	-	-
Interregional training course on uranium geochemical prospecting methods	Skofja Loka, Yugoslavia 5 to 30 September	Regular programme	16	3	5
Interregional training course on nuclear power plant construction and operation management (Phase II)	Karlsruhe, Federal Republic of Germany 5 September to 25 November	Regular programme	39	-	-
Interregional training course on nuclear power project planning and implementation (Phase I)	Argonne, Illinois 7 September to 16 December	Regular programme	36	-	-
Interregional training course on the design, use and maintenance of nuclear medical equipment	London, United Kingdom 12 September to 16 December	Regular programme	16	-	-
Study tour on the technical aspects of safeguards and the control of nuclear material	Austria, Czechoslovakia, German Democratic Republic and the Soviet Union 12 September to 11 October	Regular programme	18	-	-
Regional training course on nuclear laboratory technicians' training	Kuala Lumpur, Malaysia 10 October to 2 December	Regular programme	16	-	8
Regional training course on the economic and technical aspects of nuclear power with emphasis on manpower development	Seoul, Korea, Republic of 5 to 16 December	UNDP	22	-	14
Interregional training course on plant breeding for disease resistance, including the utilization of induced mutation techniques	New Delhi, India 14 November to 13 December	SIDA	15	-	5

<sup>a/</sup> The figures under (1) denote the number of award holders whose cost of participation was met out of project funds; those under (2) denote the number of participants who attended at the expense of the Government, another organization or programme; and those under (3) denote the number of local participants. No stipends or international travel costs are payable out of project funds in respect of participants shown under (2) and (3).

## ANNEX IV

FORMAL REPORTS SUBMITTED TO RECIPIENT COUNTRY GOVERNMENTS<sup>a/</sup>

## A. Experts' final reports

Reference number	Name of expert	Subject	Country of assignment
1184	Hammond, S.B. Skjoeldebrand, R.	Nuclear manpower qualification and training	Brazil
1185	Garcia, E.J. Murdas de Fiori, A.	Isotopes in medicine (Radio-immunoassay and related procedures)	Uruguay
1186	Specter, H.	Nuclear power plant safety (Safety evaluation of Laguna Verde Unit I)	Mexico
1187	O'Boyle, D.	Fuel element technology (Fission gas behaviour in ceramic nuclear fuels)	Argentina
1188	Dakshinamurti, C.	Use of radioisotopes in agriculture	Bangladesh
1190	Kokke, R.	Radiation microbiology	Greece
1191	Servian, J.L.	Nuclear energy planning <sup>b/</sup>	Panama
1192	Rodgers, R.W. Bates, A.N.	Uranium-bearing potential of the Jackson Formation (Eocene) of Northern Mexico	Mexico
1193	Tsai, C.H.	Nuclear power planning	Malaysia
1194	Kuoppamaeki, R.	Use of radioisotopes in hydrology	Syrian A.R.
1195	Moser, H.	Use of radioisotopes in hydrology	Yugoslavia
1196	Yoshida, S.	Use of radioisotopes in agriculture	Pakistan
1197	Kaplanis, J.N.	Use of radioisotopes in entomology	Pakistan
1198	Iya, V.K.	Radioisotope production: Sealed sources (Part II)	Argentina
1199	Pecorini, V.	Use of radioisotopes in medicine <sup>b/</sup>	Uruguay

Reference number	Name of expert	Subject	Country of assignment
1201	Touya, E.	Use of radioisotopes in medicine <sup>b/</sup>	Costa Rica
1202	Nuquue, F.L.	Use of radioisotopes in plant pathology	Korea, R.
1203	Lloyd, O.E.S.	Atomic energy planning <sup>c/</sup>	Niger
1204	Goso, R.P. Guerrero, G.H. Radicella, R.	Central radioisotope laboratory <sup>b/</sup>	Uruguay
1205	Truong Binh	Use of radiotracers for the study of root development of rain-fed rice in the Ivory Coast <sup>c/</sup>	Ivory Coast
1206	Svensson, E.O.	Hospital physics	Greece
1207	Palacios, E.	Technological applications of nuclear energy: Disposal of radioactive wastes <sup>b/</sup>	Chile
1208	Belluco, A.E.	Exploration for uranium (Cotaje and Marquez) <sup>b/</sup>	Bolivia
1209	Fontes, J.C.	Use of isotope techniques in groundwater exploration in the region of Ghana	Ghana
1210	Long, W.H.	Application of nuclear techniques in entomology	Brazil
1211	Yadigaroglu, G.	Nuclear power plant safety	Brazil
1212	Barrada, Y.	Isotopes in agriculture	Syrian A.R.
1214	Mogard, H.	Fuel elements fabrication	Romania
1215	Plato, P.	Radiation protection	Hungary
1217	Lassmann, K.	Structural analysis of fuel elements	Argentina
1218	Kelley, M.T.	Environmental radioactivity	Greece
1219	Quittner, P.	Activation analysis	Zaire
1220	Crawford, C.G.	National Centre for Radiation Technology	Egypt
1221	Bock-Werthmann, W.	Radiochemistry	Uruguay
1222	Drexler, G.G.	Dosimetry and calibration of radiation sources	Colombia

Reference number	Name of expert	Subject	Country of assignment
1223	Plata Bedmar, A.	Technological applications of nuclear energy: Application of radiotracers in industry <sup>b/</sup>	Chile
1224	Glendon, W.G.	Use of radioisotopes in agriculture	Sri Lanka
1226	Ryan, G.S.	Improvement of cultural varieties and induced mutations <sup>c/</sup>	Zaire
1227	Nielsen, D.R.	Use of radioisotopes in agriculture	Syrian A.R.
1228	Alexis, R.	Analysis of raw materials <sup>c/</sup>	Morocco
1230	Joy, A.S.	Solvent extraction	Mexico
1231	Tapia Contreras, J.	Micrometeorology <sup>b/</sup>	Chile
1232	Stupnicki, R.	Radioimmunoassay	Syrian A.R.
1233	Fernandez-Gonzales, J.	Isotopes in agriculture <sup>b/</sup>	Uruguay
1234	Bennett, J.A.	Raw materials prospection	Zambia
1235	Derbyshire, E.	Nuclear techniques in plant biochemistry	Brazil
1236	Goso, R.P.	Hot cells for the production of radioisotopes <sup>b/</sup>	Chile
1237	Diefenbacher, W.	Fuel reprocessing	Argentina
1238	Vidal Arnau, J.	Hospital physics <sup>b/</sup>	Chile
1239	Muehling, G.	Uranium oxide ceramics	Mexico
1240	Blixt, S.	Application of nuclear techniques in plant breeding	Brazil
1241	Stewart, R.	Fuel fabrication	Mexico
1242	Gegus, E.	Microanalysis by laser excitation	Argentina
1243	Cembal, S.J.	Technological applications of nuclear energy: Quality control of radioisotopes and radio-pharmaceuticals <sup>b/</sup>	Chile

Reference number	Name of expert	Subject	Country of assignment
1244	Djurdjevic, Dj.	Use of radioisotopes in animal science	Thailand
1246	Rosen, M.	Reactor safety	Greece
1247	Mistry, K. B.	Use of radioisotopes in agriculture	Sri Lanka
1249	Tait, G. W. C.	Radiation protection	Singapore
1251	Venkateswarlu, Ch.	Nuclear chemistry	Bangladesh
1252	Clark, D. J.	Nuclear physics	India
1253	Huth, G. C.	Nuclear detectors	Israel
1255	Hunzinger, W.	Safety of reprocessing plants	Mexico
1258	Uhrin, J.	Radiochemical analysis	Mongolia
1259	Fitz, L.	Nuclear power plant inspection and tests	Korea, R.
1260	Niemann, E. G.	Radioisotopes in agriculture	Hungary
1261	Alvarez Alduan, F.	Analysis of nuclear materials <sup>b/</sup>	Colombia
1262	Braun, T.	Radiochemistry	Jamaica
1263	Friessel, M. J.	Radioisotopes in agriculture	Greece
1265	Behringer, K.	Nuclear kinetics	Argentina
1267	Broeshart, H.	Use of radioisotopes in agriculture	Peru
1268	Lawson, R. C.	Neutron dosimetry and standardization	Israel
1269	Muset, J. A.	Uranium prospectio <sup>b/</sup>	Uruguay
1270	Wasserroth, K.	Reactor utilization	Ghana
1271	Lloyd-Jones, C. P.	Use of radioisotopes in agriculture	Syrian A. R.
1272	Jenker, D. H.	Quality control of fuel element fabrication	Argentina
1274	Wright, H. A.	Nuclear power plant safety	Brazil
1275	Smith, A. Y.	Uranium prospectio	Chile

Reference number	Name of expert	Subject	Country of assignment
1276	Moser, H.	Use of radioisotopes in hydrology II	Yugoslavia
1277	Springer-Lederer, H.	Radiochemistry	Panama
1278	Dressler, G.	Fuel element fabrication	Argentina
1279	Blewitt, T.H.	Irradiated materials	Argentina
1280	Brite, D.W.	Fuel design	Mexico
1283	Plumtree, A.	Fatigue at high temperatures	Argentina
1284	Vana, N.	Thermoluminescence dosimetry	Ecuador

B. Technical reports emanating from UNDP-assisted projects

Recipient country	Project title	Report title	Technical report number
Egypt	National Centre for Radiation Technology	Microbiology	1
Pakistan	Exploration for uranium in the Siwalik Sandstones, Dera Ghazi Khan District	Geochemical exploration in the Siwalik Group	7

C. Terminal reports on projects assisted by UNDP

Recipient country	Project title	Project Manager/ Chief Technical Adviser
Pakistan	Exploration for uranium in the Siwalik Sandstones, Dera Ghazi Khan District	J. A. Bennett

a/ The reports are available in English unless otherwise indicated. No data have been included in respect of reports whose distribution is restricted to the recipient Government or when no notification has been received that reports submitted in connection with UNDP-financed assistance have been "de-restricted".

b/ Available in Spanish only.

c/ Available in French only.

## ANNEX V

VOLUNTARY CONTRIBUTIONS AND COST-FREE FELLOWSHIPS FOR THE  
1977 REGULAR PROGRAMME

1. As requested by the Technical Assistance Committee of the Board of Governors information is given in Table A below in respect of the pledges of voluntary contributions of Member States to the General Fund for 1977.

Table A

Voluntary contributions pledged and paid to the General Fund for 1977  
as at 31 December 1977

Member State (1)	1977 Base rate (2)	Share of \$6 million target for voluntary contributions for 1977 using the base rate <sup>a</sup> / (3)	Pledged \$ (4)	Paid \$ (5)
Afghanistan	0.02	1 200	-	-
Albania	0.02	1 200	-	-
Algeria	0.08	4 800	-	-
Argentina	0.86	51 600	51 600	51 600
Australia	1.49	89 400	84 967	84 967
Austria	0.58	34 800	34 800	34 800
Bangladesh	0.08	4 800	-	-
Belgium	1.09	65 400	-	-
Bolivia	0.02	1 200	-	-
Brazil	0.80	48 000	55 000	55 000
Bulgaria	0.15	9 000	9 000	9 000
Burma	0.03	1 800	1 800	-
Byelorussian Soviet Socialist Republic	0.48	28 800	26 525	26 525
Canada	3.29	197 400	197 400	197 400
Chile	0.15	9 000	9 250	9 250
Colombia	0.17	10 200	-	-
Costa Rica	0.02	1 200	1 200	1 200
Cuba	0.11	6 600	6 600	6 600
Cyprus	0.02	1 200	1 200	1 200
Czechoslovakia	0.92	55 200	21 815	21 815
Democratic Kampuchea	0.02	1 200	-	-
Democratic People's Republic of Korea	0.07	4 200	-	-
Denmark	0.65	39 000	39 000	39 000
Dominican Republic	0.02	1 200	-	-
Ecuador	0.02	1 200	1 200	1 200
Egypt	0.12	7 200	7 143	7 143
El Salvador	0.02	1 200	-	-
Ethiopia	0.02	1 200	-	-
Finland	0.44	26 400	26 400	26 400
France	6.07	364 200	120 000	120 000
Gabon	0.02	1 200	-	-
German Democratic Republic	1.26	75 600	83 333	83 333
Germany, Federal Republic of	7.35	441 000	441 000	441 000
Ghana	0.04	2 400	2 400	-
Greece	0.33	19 800	-	-
Guatemala	0.03	1 800	300	300
Haiti	0.02	1 200	-	-
Holy See	0.02	1 200	-	-
Hungary	0.34	20 400	48 008	48 008
Iceland	0.02	1 200	1 200	1 200
India	1.24	74 400	74 400	74 400
Indonesia	0.20	12 000	12 000	-
Iran	0.21	12 600	20 000	20 000
Iraq	0.05	3 000	70 000	70 000
Ireland	0.16	9 600	9 600	9 600
Israel	0.22	13 200	13 200	13 200
Italy	3.73	223 800	-	-
Ivory Coast	0.02	1 200	-	-
Jamaica	0.02	1 200	-	-
Japan	7.40	444 000	444 000	444 000



(1)	(2)	(3)	(4)	(5)
Jordan	0.02	1 200	-	-
Kenya	0.02	1 200	-	-
Korea, Republic of	0.11	6 600	6 600	6 600
Kuwait	0.09	5 400	5 400	5 400
Lebanon	0.03	1 800	-	-
Liberia	0.02	1 200	-	-
Libyan Arab Jamahiriya	0.11	6 600	-	-
Liechtenstein	0.02	1 200	1 200	1 200
Luxembourg	0.04	2 400	-	-
Madagascar	0.02	1 200	-	-
Malaysia	0.07	4 200	4 200	4 200
Mali	0.02	1 200	-	-
Mauritius	0.02	1 200	1 200	-
Mexico	0.89	53 400	53 400	35 821
Monaco	0.02	1 200	-	-
Mongolia	0.02	1 200	1 200	1 200
Morocco	0.06	3 600	3 600	3 600
Netherlands	1.28	76 800	76 800	76 800
New Zealand	0.29	17 400	-	-
Nicaragua	0.02	1 200	-	-
Niger	0.02	1 200	1 200	1 200
Nigeria	0.10	6 000	-	-
Norway	0.45	27 000	27 000	27 000
Pakistan	0.15	9 000	9 000	9 000
Panama	0.02	1 200	1 100	1 100
Paraguay	0.02	1 200	-	-
Peru	0.07	4 200	-	-
Philippines	0.19	11 400	11 500	11 500
Poland	1.31	78 600	50 201	50 201
Portugal	0.16	9 600	10 000	10 000
Qatar	0.02	1 200	1 200	1 200
Romania	0.31	18 600	-	-
Saudi Arabia	0.06	3 600	3 600	3 600
Senegal	0.02	1 200	1 200	1 200
Sierra Leone	0.02	1 200	-	-
Singapore	0.04	2 400	1 800	1 800
South Africa	0.52	31 200	31 200	31 200
Spain	1.03	61 800	30 000	23 500
Sri Lanka	0.03	1 800	1 800	1 800
Sudan	0.02	1 200	2 500	2 500
Sweden	1.35	81 000	81 000	81 000
Switzerland	0.85	51 000	51 000	51 000
Syrian Arab Republic	0.02	1 200	-	-
Thailand	0.11	6 600	6 600	6 600
Tunisia	0.02	1 200	-	-
Turkey	0.30	18 000	18 000	18 000
Uganda	0.02	1 200	-	-
Ukrainian Soviet Socialist Republic	1.77	106 200	107 239	107 239
Union of Soviet Socialist Republics	13.43	805 800	795 756	795 756
United Arab Emirates	0.02	1 200	1 200	1 200
United Kingdom of Great Britain and Northern Ireland	5.50	330 000	330 000	330 000
United Republic of Cameroon	0.02	1 200	-	-
United Republic of Tanzania	0.02	1 200	1 200	1 200
United States of America	27.51	1 650 600	1 650 000	1 650 000
Uruguay	0.06	3 600	-	-
Venezuela	0.33	19 800	19 800	19 800
Viet Nam	0.06	3 600	-	-
Yugoslavia	0.35	21 000	21 000	20 000
Zaire	0.02	1 200	-	-
Zambia	0.02	1 200	1 200	1 200
<b>TOTAL</b>	<b>100.02<sup>b/</sup></b>	<b>6 001 200<sup>b/</sup></b>	<b>5 334 637</b>	<b>5 292 158</b>

a/ As recommended in General Conference resolution GC(V)/RES/100.

b/ Nicaragua became a Member State of the Agency after the base assessment rates for 1977 had been established, which accounts for the total exceeding 100% of the target of \$6 000 000 for voluntary contributions to the General Fund for the year 1977.

2. A list of the fellowships made available to the Agency free of charge in 1977 is given in Table B below; some of the Type II fellowships awarded were carried over from a previous year.

Table B  
Fellowships offered or provided free of charge

Donor	Number of fellowships			
	Available (1)	(2)	Awarded (3)	(4)
<b>I. <u>Member States</u></b>				
Argentina	5	60	1	6
Austria	-	17	3	16
Belgium	6	36	3	26
Brazil	10	120	2	15
Bulgaria	2	12	-	-
Czechoslovakia	9	-	-	-
Denmark	5	60	6	56
France	-	140	16	140
Germany, Federal Republic of	25	125	9	72
Hungary	4	-	3	16
India	5	-	3	18
Israel	-	45	2	14
Italy	25	200	19	179
Japan	10	90	3	24
Mexico	2	-	2	25
Netherlands	8	-	4	42
Pakistan	6	-	-	-
Philippines	3	-	1	12
Poland	10	-	4	46
Romania	10	100	-	-
Spain	5	60	5	45
Thailand	2	-	-	-
United Kingdom	4	-	5	46
United States of America	<u>a/</u>	-	115	1 199
Yugoslavia	-	22	1	3
<b>II. <u>Regional organizations</u></b>				
JINR/Dubna	3	36	-	-

- (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.

ANNEX VI  
PROJECTS UNDER IMPLEMENTATION FOR UNDP  
(in thousands of dollars)

Project code number and title	Amount approved	Approved budgets					
		Prior to 1977	1977 <sup>a</sup> /	1978	1979	1980	1981
<u>Albania</u>							
ALB/72/002	Assistance to the Institute of Nuclear Physics, Tirana	60	52	8			
ALB/74/002	Gamma encephalographic laboratory	96	51	45			
<u>Argentina</u>							
ARG/71/537	National Centre for Non-destructive Testing and Quality Control	927	279	205	382	61	
<u>Bangladesh</u>							
BGD/77/008	Exploration for uranium and thorium	34	-	32	2		
<u>Brazil</u>							
BRA/71/556	Application of nuclear technology in agriculture	1290	952	278	60		
BRA/76/003	Nuclear manpower qualification and training	2112	-	105	931	748	305 23
<u>Burma</u>							
BUR/74/005	Genetic improvement of crop plants using induced mutations	93	91	2			
<u>Chile</u>							
CHI/71/545	National Nuclear Energy Centre, Santiago	841	599	242			
CHI/74/005	Uranium prospection	1162	417	409	250	86	
CHI/76/008	Nuclear power plant	1408	-	193	743	345	127
<u>Cuba</u>							
CUB/71/013	Use of isotopes for protein synthesis	35	18	17			
CUB/77/001	Introduction of nuclear techniques into the national economy	8	-	8			
<u>Czechoslovakia</u>							
CZE/76/001	Technical problems and protection in power plants	7	-	7			
<u>Egypt</u>							
EGY/71/032	Radiation dosimetry after accidents	87	83	4			
EGY/73/037	National Centre for Radiation Technology	641	253	257	113	18	
<u>Ghana</u>							
GHA/74/004	Training in the use of nuclear techniques	75	36	10	24	5	

Project code number and title	Amount approved	Approved budgets					
		Prior to 1977	1977 <sup>a</sup> /	1978	1979	1980	1981
<u>Greece</u>							
GRE/73/006	Exploration for uranium in Central and Eastern Macedonia and Thrace	656	530	126			
<u>Hungary</u>							
HUN/71/509	Use of ionizing radiation for the sterilization of medical supplies	527	384	143			
<u>India</u>							
IND/70/001	Atomic energy development	35	30	5			
<u>Indonesia</u>							
INS/68/043	Application of radioisotopes in agriculture - mutation breeding	127	112	15			
INS/75/041	Preliminary siting mission on nuclear power station in Java	10	9	1			
<u>Israel</u>							
ISR/73/035	Assistance in training in nuclear medicine	51	46	5			
<u>Morocco</u>							
MOR/73/019	Training and research in applied nuclear physics at the Faculty of Sciences, Rabat	658	265	221	172		
<u>Nigeria</u>							
NIR/72/005	Use of nuclear techniques in animal production	547	-	26	222	208	91
NIR/72/044	Insecticidal investigation for tsetse fly eradication	187	79	66	42		
<u>Pakistan</u>							
PAK/72/014	Plant breeding using induced mutations	97	39	58			
PAK/74/002	Exploration for uranium in the Siwalik Sandstones	836	651	124	61		
<u>Peru</u>							
PER/76/002	Nuclear energy	1893	-	189	325	565	511 303
<u>Philippines</u>							
PHI/75/003	Training and consultancy in nuclear power plant safety analysis, engineering and public information	118	-	28	90		
<u>Korea, Republic of</u>							
ROK/71/535	Radiation processing demonstration facility	453	438	15			
<u>Romania</u>							
ROM/72/001	Development of nuclear technology	1435	1197	148	90		

Project code number and title	Amount approved	Approved budgets				
		Prior to 1977	1977 <sup>a/</sup>	1978	1979	1980
<u>Sri Lanka</u>						
SRL/72/045	Radiobiology Unit, Faculty of Medicine, Peradeniya	15	10	5		
<u>Sudan</u>						
SUD/73/014	Activation analysis - radioisotope studies of contamination	150	149	1		
SUD/74/018	Use of isotopes in studies on adaptation nutrition and the health of domestic animals	99	62	37		
<u>Syrian Arab Republic</u>						
SYR/70/002	Use of radioisotopes in medicine and biology	81	60	21		
SYR/72/018	Use of isotopes in agriculture - efficiency in water and fertilizer use	89	58	27	4	
SYR/72/019	Use of radioisotopes in animal science	47	17	17	13	
<u>Turkey</u>						
TUR/72/036	Exploration for uranium in South West Anatolia	786	669	117		
TUR/74/053	Utilization of isotopes in hydrology	106	65	41		
<u>Uruguay</u>						
URU/69/007	Applied radiochemistry	58	57	1		
<u>Yugoslavia</u>						
YUG/73/001	Nuclear research and training in agriculture	138	97	41		
YUG/74/025	Radiation unit for the industrial application of ionizing radiation	433	124	209	100	
<u>Asia and the Pacific</u>						
RAS/75/035	Regional training course on the technical and economic aspects of nuclear power with emphasis on manpower development	45	-	45		

<sup>a/</sup> The carry-over of the unimplemented provisions into 1978 and future years has been requested.





