

THE PROVISION
OF TECHNICAL ASSISTANCE
BY THE AGENCY
WITH SPECIAL REFERENCE
TO 1973

Report by the Director General

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List of abbreviations

Agency	International Atomic Energy Agency
CERN	European Organization for Nuclear Research
FAO	Food and Agriculture Organization of the United Nations
IAEA	International Atomic Energy Agency
ILO	International Labour Organisation
MW(e)	Megawatt (electric)
SIDA	Swedish International Development Authority
Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

CSSR	Czechoslovak Socialist Republic
Egypt, A.R.	Arab Republic of Egypt
Germany, F.R.	Federal Republic of Germany
Korea, R.	Republic of Korea
Libyan A.R.	Libyan Arab Republic
Syrian A.R.	Syrian Arab Republic
Tanzania, U.R.	United Republic of Tanzania
USSR	Union of Soviet Socialist Republics
UK	United Kingdom of Great Britain and Northern Ireland
USA	United States of America
Zaire, R.	Republic of Zaire

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	Other fields of application of isotopes and radiation
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 1973; 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. In addition, information is given in Annex IV with regard to the UNDP projects for which the Agency served as subcontractor in 1973.
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 Agency projects have 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 1973, 75 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]. Almost 75% of all assistance provided related to the application of isotopes and radiation in agriculture, nuclear engineering and technology, to the subjects covered by the classification heading "Other fields of application of isotopes and radiation", nuclear physics and medicine.
5. The assistance, including assistance in kind, was provided through the services of 256 experts, lecturers and visiting professors, the supply of equipment to a value of about \$2 055 000, and 574 fellowship awards for individual study, scientific visits, two study tours and other short-term training projects.
6. The resources allocated for carrying out the Agency's 1973 technical assistance programme amounted to approximately \$7 540 000 (Table 1), whereas the total value of the technical assistance actually provided in 1973 was about \$5 765 000 (Tables 4 and 7), which includes payments against 1973 and prior years' obligations, as well as assistance in kind, and represents an increase of about \$270 000 or 5% over the sum of \$5 493 000 provided in 1972 (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 activities in which developing countries have shown special interest in 1973, followed by information concerning UNDP procedures relating to the programming and co-ordination of technical assistance.

[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(XVII)/INF/142.

A. TECHNICAL CO-OPERATION ACTIVITIES IN WHICH GOVERNMENTS
HAVE SHOWN SPECIAL INTEREST

1. The use of nuclear techniques in agricultural research

8. During the past ten years, that is, beginning with the commencement of field operations on a large-scale project in Yugoslavia in 1964, the Agency has provided more assistance each year in the application of radiation and isotopes in agriculture than in any other single 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 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 need for a continuing 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.

9. There is an enormous agricultural productivity gap between backward areas in the developing countries and the highly sophisticated farming operations in some of the industrialized countries. Yet, the potential in both areas can be the same. The difference lies in the methods and materials which are used to improve yields.

10. Simple improvements in methods, the addition of some fertilizer at the right time and better seeds and livestock can result in an immediate and significant increase in productivity. The regular and consistent use of these improvements in methods has resulted in what is known as the "green revolution" in some developing and industrialized countries, in which the increases in agricultural productivity have, however, tended to level off in recent years. In order to achieve further increases in agricultural productivity, a more sophisticated technology is required which involves the use of more accurate and efficient research methods and tools.

11. Atomic energy technology - the use of ionizing radiation and isotopic tracers - puts some of the most accurate and efficient tools available into the hands of agricultural scientists. Nuclear methods have been used on a routine basis for years in the laboratories and on experimental farms in the developed countries and have contributed significantly to advances in the soil, plant, animal and food sciences. Some developing countries have already begun to make good use of this technology but most still lack sufficient trained manpower, equipment and the prerequisite scientific base to be able to benefit from it.

12. It has been the experience of the Agency that the introduction of nuclear techniques in a developing country must take cognizance of the general technological development and scientific infrastructure in the country. Timely and properly executed applications of nuclear techniques have been shown to contribute significantly, for example, to agricultural productivity, and conferring with requesting Governments to determine when assistance and what type and volume of assistance can be effectively provided has been a decisive factor governing the planning and execution of the Agency's technical assistance programmes.

13. In the past the Agency has provided modest amounts of assistance to a number of countries for the application of nuclear techniques to solve specific and urgent problems, in the form of experts and specialized equipment, often together with fellowship training for the counterpart staff. This programme has been successful and well received, judging by the results and the growing number of requests for assistance of this kind. However, especially in the larger and more scientifically advanced developing countries, these relatively small injections of assistance have not been instrumental in establishing permanency in the use of nuclear applications in the food and agriculture sector; under the circumstances, a larger and a more concerted aid effort is needed to achieve this effect.

14. Thus, instead of promoting the provision of small-scale assistance to 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 project in a country. This was done in three countries and resulted in the establishment of centralized facilities equipped to serve the entire national food and agricultural research effort. These facilities have developed into "centres of excellence" as far as the application of nuclear and other modern technology to agricultural research and development is concerned.

15. The first of these large-scale 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. In this particular case there was considerable follow-up assistance financed by UNDP and, under the approved country programme for Yugoslavia, UNDP continues to support some of the activities that received UNSF assistance in the past.

16. As a result of the assistance rendered to the Government of Yugoslavia, the Institute for the Application of Nuclear Energy in Agriculture, Veterinary Medicine and Forestry (INEP) was established at Zemun near Belgrade. INEP is now a widely recognized centre and serves as a national focal point for nuclear-aided research. It 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. INEP is perhaps best known for its development of irradiation-attenuated vaccines against sheep and goat lung-worms. The Yugoslav counterparts have since served the Agency in various activities as technical assistance experts in other developing countries. In INEP's work programme the main emphasis is now being put on the improvement of plant protein by mutation breeding, animal nutrition and health as well as on various studies on soil fertility and fertilizer use.

17. The second of the large-scale projects to be executed by the Agency in agriculture has been carried out in India since 1968. In this large country there are numerous state and federal universities and research institutes that maintain extensive facilities which are devoted exclusively to research and training to improve agricultural productivity. In addition, the Department of Atomic Energy carries out a substantial programme of work in food and agriculture. It was decided to consolidate UNDP aid to agriculture in India in order to ensure optimum co-ordination and co-operation between the various institutes concerned, avoid unnecessary duplication of equipment and effort, and make more effective utilization of development aid.

18. Accordingly, with UNDP assistance, facilities for the application of nuclear techniques in agriculture were strengthened at four national institutes in India. The major portion of UNDP's assistance has been provided to the Indian Agricultural Research Institute (IARI) in New Delhi where a Nuclear Research Laboratory (NRL) was established, equipped and staffed on the IARI campus. The NRL, inaugurated in 1971 by Mrs. Indira Gandhi and now in full operation, is the central national facility designed to serve the IARI and other agricultural research institutes in respect of research involving the use of nuclear and other advanced technology. The NRL has so far been primarily concerned with nuclear applications in soil science, plant breeding, as well as seed oil-content and protein-content analysis. Substantial aid was also provided to the Agricultural Division of the Bhabha Atomic Research Centre in Trombay, where UNDP assistance was primarily concentrated on nuclear applications in entomology, groundnut and rice breeding, and soil fertility studies, in co-operation with other federally-operated agricultural institutes.

19. The other two institutes in India which are receiving UNDP assistance to improve their capability to make good use of nuclear techniques in their research and development programmes are the National Dairy Research Institute (NDRI) and the Indian Veterinary Research Institute (IVRI). While the NDRI has concentrated on the use of isotopes in various physiological and nutritional studies relevant to dairy production, the IVRI has emphasized development work on the exploitation of the radiation vaccine technique and the use of isotopes in research on better methods of livestock nutrition based on non-protein

sources of nitrogen (for example, using urea, molasses and straw). As a result of project work, the Government of the State of Jammu and Kashmir has constructed a facility near Srinagar to mass-produce radiation vaccines to inoculate sheep in the Himalayan foothills against the lungworm. Large-scale field experiments had shown a difference in weight-gain between treated and untreated five-month-old lambs of almost 3 kilograms. The diets based on urea and molasses developed at the IVRI have already been put to extensive use in emergency operations in Maharashtra State to save cattle from starvation in drought-stricken areas.

20. The UNDP assistance provided during the first five years amounted in value to \$1.4 million, and a supplementary allocation of \$237 000 for 1973-1974 has been approved. The institutes participating in the project have already served as host for national, regional and interregional training courses, seminars and meetings.

21. The third example of large-scale UNDP assistance provided through the Agency is that of an agricultural project initiated in 1972 in Brazil. This project, to be assisted over a five-year period by UNDP to the extent of approximately \$900 000, aims at the improvement of agricultural production through the application of nuclear technology; its headquarters are at the Centro de Energia Nuclear na Agricultura (CENA) and it is jointly sponsored by the National Atomic Energy Commission and the Escola Superior Agrícola "Luiz de Queiroz" (ESALQ) of the University of São Paulo in Piracicaba, São Paulo State. The work plan for the project places equal emphasis on training and research in a variety of subjects including soil fertility, plant nutrition, plant disease, insect control, plant breeding, and animal nutrition and health. The project is designed to strengthen existing training and research facilities for the application of nuclear technology to agricultural research at ESALQ, in addition to serving as the central facility for atomic energy applications in food and agriculture for the whole country. Soil-plant science activities under the project concentrate on development work on the bean variety Phaseolus vulgaris, which constitutes the most important high-protein source for the Brazilian population. The work at CENA is integrated in the National Bean Project of the Ministry of Agriculture, thereby ensuring full collaboration with agricultural research institutes and universities in other parts of Brazil.

22. The above-mentioned three large-scale projects were designed to respond to the needs of countries with a history of active agricultural research and a rapidly developing agricultural industry. Complementary as they are, nuclear techniques as applied through these projects have served to amplify the effectiveness of agricultural research. Quite apart from the practical results obtained, which already bear witness to the soundness of having implemented these particular projects, their main objective remains that of increasing the choice of methods available to agricultural research workers and planners in charting the course of the agricultural sector in making a contribution towards economic and social development.

23. These three projects may very well serve as models for similar projects in other advanced, developing Member States. Especially for the smaller and less advanced developing countries, however, assistance for the application of nuclear technology in agriculture would be most effective when provided for small-scale projects designed to deal with specific problems.

2. Nuclear power

24. A primary function of the Agency is the provision of assistance to Member States, especially to the developing countries, in respect of the practical application of nuclear energy, including the production of electric power. [4] The future importance of nuclear power was foreseen in the first annual report of the Board of Governors to the General Conference in 1958, in which it was stated that a major initial objective of the Agency was

[4] See Article III.A.2 of the Statute.

to help Member States prepare for the eventual use of nuclear power, that help would be provided by employing the standard methods of technical assistance evolved by the United Nations organizations [5] and that the commissioning of reactors would depend upon the building up of a cadre of trained persons [6].

25. It has, however, taken a long time for the question of the introduction of nuclear power to arrive at the stage of technical maturity hoped for in the late 1950s. That this stage has now been reached is reflected in a great increase, beginning in 1971, in the orders for nuclear plants in the industrialized countries. The Agency's market survey for nuclear power, concluded in mid-1973, also clearly showed that nuclear power, on economic grounds alone, can be expected to constitute a sizable share of the electricity generating capacity to be installed in the developing countries in the 1980s. [7] The stepwise increase in oil prices which occurred in late 1973 means, in terms of economics, that nuclear power is now in urgent demand as an alternative to conventional sources of energy.

26. At the present time only four developing Member States have nuclear power stations (six in all) in operation with a total generating capacity of 1130 MW(e). Six additional developing countries have ordered their first nuclear plants. The nuclear power market survey of 14 developing Member States indicated that at least 11 of the surveyed countries should have programmes for the installation of nuclear power reactors with a total capacity of about 50 000 MW(e) during the period 1980-1990; these findings are now outdated due to oil price increases. Given present oil prices, it would be in the interest of all of the 14 surveyed countries to have nuclear power programmes for the installation of power reactors in the 1980s. Extrapolating to include the power needs of all the developing countries, it is estimated that it would be in the interest of 20-30 of these countries to have nuclear power plants in operation or under construction or to consider the purchase of their first nuclear power station. If power reactors in the electricity-generating range 100-400 MW(e) were available commercially in proven designs the number of developing countries that could make effective use of nuclear power would be even higher. Thus, from a slow beginning, it is clear that we are now confronted with a situation in which nuclear power programmes must be established or expanded in the developing countries and in which the Agency's assistance will be urgently needed.

27. The higher cost of energy from conventional sources will also call for the use of nuclear energy for other purposes, in particular, for desalting, which is likely to meet an important need in some developing countries. Desalting technology has now reached a stage where plants capable of processing tens of millions of gallons of water per day, using nuclear heat, are technically and economically feasible. Nuclear desalting is, however, only likely to be of importance in special locations, while the general supply of energy by means of nuclear-produced electricity for industrial, commercial and residential use is clearly of world-wide importance.

(a) The Agency's capability to provide assistance

28. The Agency's assistance to the developing countries in the field of nuclear power has included the provision of advisory missions, expert services, equipment and supplies, fellowship training, training courses, as well as the execution of UNDP projects on a country, regional and interregional basis.

[5] GC(II)/39, para. 6.

[6] Ibid., para. 9.

[7] For details, see document GC(XVII)/506.

29. Up to the end of 1973, 91 advisory missions had been sent to developing Member States in connection with potential nuclear power programmes. They were requested to make nuclear power and desalting surveys or assist in the planning of nuclear power programmes for 23 States, advise on the legal and regulatory requirements for six States, and advise on siting and safety matters for 21 States.

30. Since the beginning of the Agency's aid programme, assistance related to nuclear power and nuclear engineering activities has played a secondary but significant role. Within the field-of-activity system used to classify the technical assistance provided by the Agency, the sub-fields of most direct importance to nuclear power programmes are those entitled "Legal aspects of atomic energy", "Economic aspects of atomic energy", "Power reactors", "Reactor technology", "Safety of reactors and nuclear materials" and "Safety evaluation". Of the 2088 experts who have been provided through the Agency in the past, the assignments of only 90, or 4.3% were in the above sub-fields; 37 experts were provided for power reactor projects, 24 in respect of reactor safety and 18 for reactor technology projects. The provision of equipment has played a negligible role in these projects.

31. A survey has shown that 339 or 7.2% of the total of 4694 fellowships provided to the developing countries through the Agency have been related to nuclear power. These fellowships were awarded to students from 47 countries. The share of total awards made from year to year for nuclear power training has varied from 8.9% to 4.5% per year, with a slight downward trend observable over the period 1966-1973. Of the total of 181 awards made for scientific visits, 19 or 10.5% have been related to nuclear power.

32. Between 1966 and 1973, five survey and training courses were held on different subjects within the general framework of "technical and economic" aspects of nuclear power, with the main purpose of providing essential background information - on the basis of which decisions could be made - to staff at the senior management and executive levels, particularly from those countries where the introduction of nuclear power could be expected to be economically feasible within the near future. Training courses on the legal aspects of nuclear energy utilization and on nuclear law were held in 1968 and 1970.

33. The IAEA, as executing agency for UNDP, has also provided large-scale assistance to the Philippines on two occasions in conducting nuclear power feasibility studies. Subsequent to the last study, concluded in 1973, the Philippine Government decided to go ahead with its first nuclear power project. A nuclear power study and a survey of domestic industrial manufacturing capabilities in regard to nuclear power were also conducted for Brazil under UNDP co-sponsorship. In the present situation it is likely that assistance to projects of this kind will be requested from the Agency by a number of countries.

34. While the assistance provided so far to nuclear power projects in the developing countries has been significant, it has been directed mainly to the general preparation of atomic energy and electrical power-generating authorities for the planning and implementation of nuclear power programmes to be established in the future. Whereas activities in this field have played a more minor role in the Agency's overall programme than expected, a major change must now be expected in the form of a large increase in the volume of requests for assistance which, moreover, will be needed for definite nuclear power plant projects rather than for the planning of programmes to be implemented in the indefinite future. It is particularly interesting to note the experience gained from the provision of

Agency assistance to projects on power plant construction in Pakistan and the Republic of Korea, where missions and experts have been sent to advise on safety aspects and quality assurance and to assist in the commissioning of power plants under construction and in the pre-operational phases. It is evident that it will always be difficult for the Agency to provide advice to a Government's regulatory authority or to an electricity generating utility in a situation which is already governed to a large extent by commercial contracts. Experience has shown that there is a great need for internationally acceptable codes of practice, as well as guides and manuals of recommended procedures, covering the whole spectrum of nuclear power plant activities ranging from guidelines on contractual requirements governing the design and construction of the plant, siting and safety reviews, quality assurance programmes to commissioning and routine power plant operation.

35. It must be recognized, however, that the Agency's assistance to nuclear power projects will always be fairly modest, considering that a 500-600 MW(e) plant is likely to involve capital costs of some \$200 million.

36. The biggest problem facing a developing country embarking on its first nuclear power project is undoubtedly the lack of sufficient trained manpower. In particular, the manpower requirements for the early stages of a project are often drastically underestimated and difficult to meet: the regulatory authority may not have been established or may be grossly under-staffed and the electricity generating authority may not recognize the important differences between a conventional and a nuclear power station from the point of view of having staff qualified to carry the responsibility for the plant's safety and reliability during its operational lifetime of 25 to 30 years. Staff trained in nuclear power engineering and safety can obviously play a key role at this stage. Experience has shown that the basic requirement is a project group with a minimum local staff of 10-20 trained professionals at the siting and feasibility study stage and some 30 professionals at the bid evaluation and contract negotiation stage. These basic staffing requirements cannot be met by hiring the services of commercial firms. The requirements at the senior management and executive levels are correspondingly high. The establishment of an operations crew for the plant represents the smallest problem as the training involved is very often provided by the reactor manufacturer.

37. To meet the expected increasing number of requests for assistance, the Agency should now concentrate on providing training to facilitate the creation of competent project and regulatory cadres capable of handling the early stages of nuclear power projects, and a study is being made by the Agency to explore ways and means of meeting the demand for training of this kind.

38. In addition, the Agency, through the provision of experts and advisory services, can obviously help the developing countries by assisting in the following activities:

- (a) Setting up the necessary legislative and regulatory framework;
- (b) Site selection and evaluation;
- (c) Safety reviews;
- (d) Setting up terms of reference for feasibility studies and the evaluation of such studies;
- (e) Review of domestic manufacturing capabilities for subcontractual participation in a project;

- (f) Advising on the specifications to be included in the invitations to tender and in contracts;
- (g) Advising on procedures and methodologies to be employed, for example, in quality assurance and commissioning programmes; and
- (h) Advising on the management and organizational requirements at each stage.

This advice can be supplied by experts, but it must be recognized that finding a sufficient number of persons with the experience and competence required may be difficult now that the industrialized countries are accelerating their own nuclear power programmes.

(b) Other forms of Agency assistance

39. The survey and training courses mentioned in paragraph 32 above have provided much-needed information, and it is now planned to improve the dissemination of such information in the intervals between survey courses through the distribution of periodic publications, guide-books and manuals on recommended procedures and methodologies. Furthermore, the annual report on power reactor operating experience in Member States has been continually improved and will be supplemented by analytical reviews on the performance of proven power reactor systems. Another source of assistance of potentially immeasurable value is the collection of Agency codes of practice, standards and guidelines relevant to nuclear power programmes. Their acceptance on the widest possible basis would save money and planning effort; using them as "yardsticks" would not only benefit regulatory and electricity-generating authorities but also help vendors and Agency experts sent out to advise on or assist in connection with a particular problem.

40. Lastly, the methodologies used in the market survey for power system expansion planning have also proved to be of great value and have been made available to Member States which have data processing equipment that can use the computer programme developed for market survey purposes. In March 1974, four developing Member States submitted requests for the computer programmes and the training of engineers at the Agency in the use of these methodologies. It is likely that requests for assistance of this kind will also increase in future, as will requests for nuclear power planning studies to be performed by the Agency

B. UNDP PROCEDURES

41. As was to be expected, much time and effort were devoted in 1973 to the consolidation and implementation of the new country programming procedures which went into effect in 1972 to coincide with the initiation of UNDP's first five-year programming cycle for the period 1972-1976. The country programming exercise, described in detail in last year's report [8], continued throughout 1973 on the same basis as before, and at the end of 1973 the Agency was providing, or had agreed to provide, large- and small-scale assistance to 108 projects in 43 countries on behalf of UNDP.

42. Experience has shown that there is a need for increased flexibility in the application of UNDP procedures, additional decentralization of operating control in the form of more extensive delegation of authority to the UNDP Resident Representatives in approving

[8] GC(XVII)/INF/142, paras 33-38.

projects and for the elimination of unnecessary procedures. The agencies consult with UNDP on these and allied matters in meetings of the Programme Working Group (PWG), on which the Agency is represented, and the Inter-Agency Consultative Board (IACB), consisting of the heads of all agencies and programmes that co-operate closely with UNDP. In 1973 it proved possible to arrive at a consensus on a definition of the general principles and practices that would govern UNDP-agency consultation, wherein it was recognized that the participating organizations in UNDP have two important roles: as the source of intellectual and analytical leadership within the United Nations system in their particular fields of competence and as the principal partners responsible for implementing UNDP-financed assistance. UNDP, on the other hand, will exercise the leadership in the field and at headquarters in respect of the programming and co-ordination of the technical assistance financed under that Programme. It was furthermore established that the intellectual and the executing roles of the agencies are interrelated, each learns from the activities and experience of the other, and relations between UNDP and the agencies necessarily involve consultations in respect of these roles.

43. Under the changed circumstances brought about by UNDP's adoption of the "country" approach and the consequent restructuring of its organization and procedures, new forms and practices of consultation need to be developed: there should be full participation of the agencies in the regional meetings of UNDP Resident Representatives, representation of UNDP at important meetings organized by the agencies, visits in both directions of senior headquarters staff of UNDP and the agencies concerned with UNDP programmes and projects, and visits of UNDP Resident Representatives at appropriate times to the headquarters and the regional offices of the agencies.

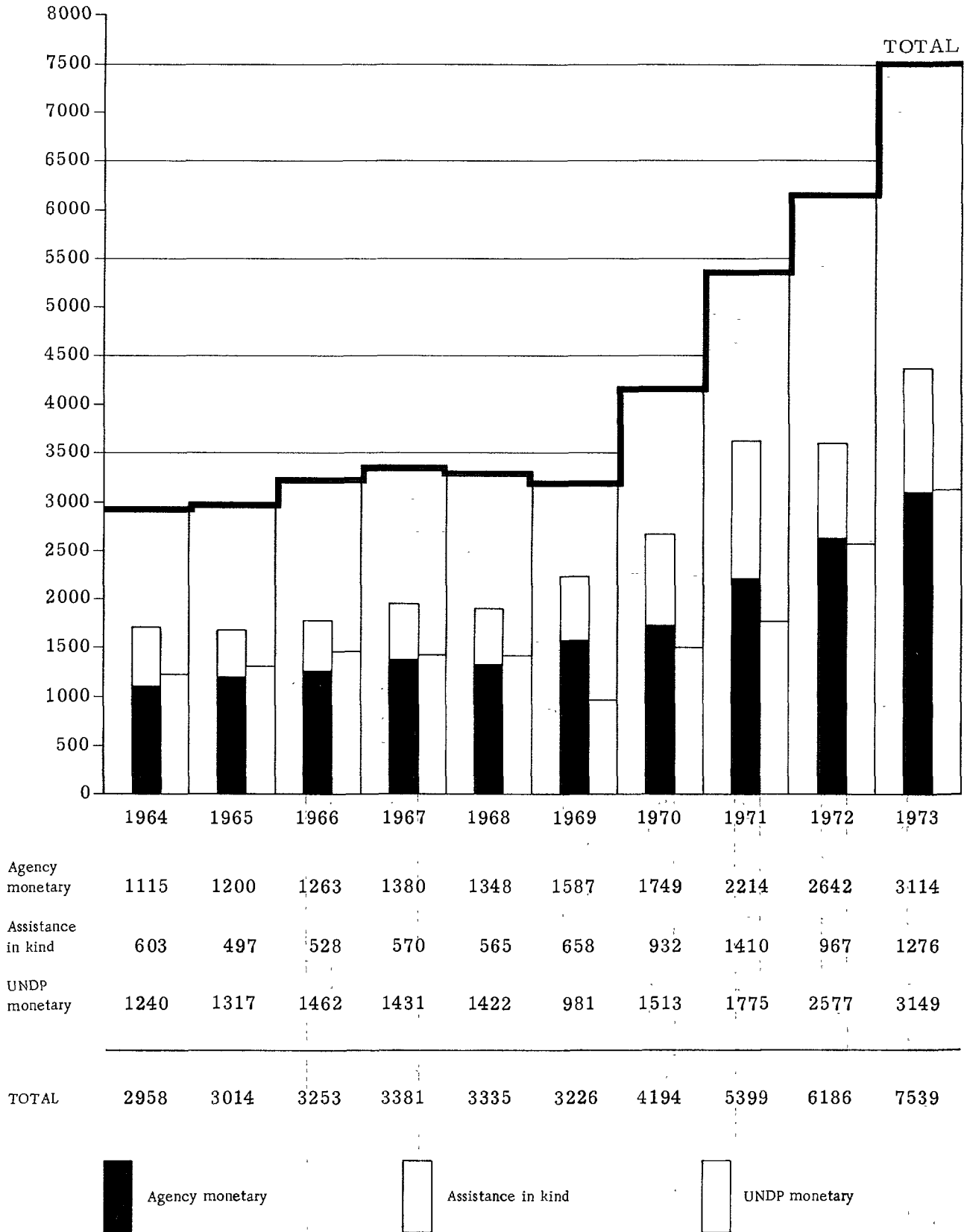
44. At the same time it was agreed, with regard to the future work and organization of the IACB and the PWG, that:

- (a) The IACB should continue to serve as a forum for mutual consultation on the part of those responsible for the management of the United Nations development system, work in as informal and flexible a manner as possible and meet at least once a year to discuss matters referred to it by the Administrator, one or more of its members and by the PWG. While the Administrator would normally seek the advice of the IACB on important policy matters pending before the UNDP Governing Council, it was recognized that it may not be practicable to refer all such matters to the IACB as a matter of course. The executive heads should be consulted by appropriate means outside the IACB on any proposed new or modified policy which has an important bearing on their responsibilities. In accordance with the decision of the UNDP Governing Council the Administrator should keep the Council informed about the activities and conclusions of the IACB, as appropriate; and
- (b) The PWG should serve as a preparatory body for IACB meetings and, under IACB's authority, would discuss and arrive at a consensus on as many issues as possible which are of relevance to the work of UNDP and the organizations. The PWG would meet twice a year and be empowered to set up smaller groups or task forces to deal with special matters (for example: centralized bulk purchasing of equipment, form of subcontracts, fellowship matters), as and when they arise, between PWG sessions. (In addition, the Working Group on Administrative and Finance Matters will continue to fulfil its separate function.)

45. Whilst these developments are of major concern to the executing agencies, they also constitute an essential framework within which the smaller agencies are able to participate in the policy-making and implementation process of UNDP. The UNDP Resident Representatives continue to represent the smaller agencies, which do not have programming staff stationed at the country, regional or sub-regional level; the Agency has found that this procedure works well and that the UNDP Resident Representatives fully assume this responsibility as and when required to do so.

FIGURE 1

RESOURCES AVAILABLE FOR
AGENCY TECHNICAL ASSISTANCE PROGRAMMES: 1964-1973
(in thousands of dollars)



Part II. ANALYSIS OF THE ASSISTANCE PROVIDED

A. AVAILABLE RESOURCES

1. General

46. The resources available to the Agency in 1973 for the provision of technical assistance came to \$7 539 000 (see Fig. 1 and Table 1), which is 21.9% higher than the figure for 1972 (\$6 186 000) and is made up as follows:

- (a) UNDP, \$3 149 000 in cash: \$1 245 000 for small-scale projects and \$1 904 000 for large-scale projects;
- (b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, \$3 114 000; and
- (c) Gifts in kind (services of cost-free and partly cost-free experts, grants of equipment in support of approved technical assistance projects, Type II fellowships and training course stipends) valued at \$1 276 000. Of this total, \$1 241 000 was made available in respect of the regular programme and \$35 000 for UNDP projects.

2. UNDP

47. Of the total of \$3 149 000 available to the Agency in cash to carry out the 1973 UNDP field programme, funds totalling \$2 345 000 were used in 1973 (\$148 000 for assistance to intercountry projects and \$2 197 000 for assistance to country programme - including large-scale - projects) and the balance of \$804 000 will be carried forward for use beginning in 1974.

3. Agency's regular programme

48. As at 31 December 1973, the pledges of voluntary contributions to the General Fund for 1973 had exceeded 94% of the target figure of \$3 million, as compared with about 83% of the \$3 million target figure in respect of 1972. The payment by Member States of current and prior years' pledges (\$2 836 000, the largest amount received in any year to date, as compared with \$2 482 000 for 1972), was reflected in the income to Operating Fund II (totalling \$3 114 000 from all sources, as compared with \$2 642 000 in 1972), from which the regular programme is financed.

4. Gifts in kind

49. The estimated value of the assistance in kind made available for 1973 programmes was \$1 276 000, which is almost one third higher than the figure of \$967 000 for 1972. This rise is attributable to increases in the value of cost-free expert services (from \$40 100 to \$90 700) and fellowships (from \$681 900 to \$960 300 consisting of Type II fellowship and training course stipends), whereas the value of equipment grants decreased somewhat (from \$245 100 to \$224 600). Although equipment grants were provided as assistance in kind by five Member States in 1973 (see Annex II. A), only the value of the offers made by Finland, Sweden and the United States of America in respect of projects included in the 1973 regular programme are contained in the \$224 600 total given above.

5. Funds-in-trust

50. Assistance valued at \$2000 was provided by the Agency under funds-in-trust arrangements in 1973.

6. Use of resources

51. The total value of the technical assistance being provided by the Agency exceeded the \$9.2 million mark for the first time in 1973 (the figure for 1972 was \$8.5 million), and consisted of \$5 764 400 in assistance provided and \$3 474 400 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 1973 than in any previous year, that is, \$271 700 or about 5% more than in 1972, the year in which the largest amount of assistance up to then had been furnished. The breakdown of the total of unliquidated obligations and assistance in kind outstanding at 31 December 1973 is as follows: \$612 600 for expert services, \$1 423 400 for equipment and supplies and \$1 438 400 for fellowships.

52. As in earlier years, regular programme expenditures and unliquidated obligations at the end of 1973 exceeded the cash resources in respect of that year's regular programme, 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 1972 and prior years. The type and estimated value of the assistance in kind made available to the Agency in 1973 is given - by donor - in Annex II, which also includes information on possible assistance to projects not included in the 1973 regular programme owing to lack of funds.

B. DISTRIBUTION OF ASSISTANCE

1. By field of activity

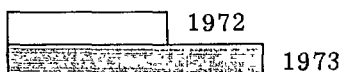
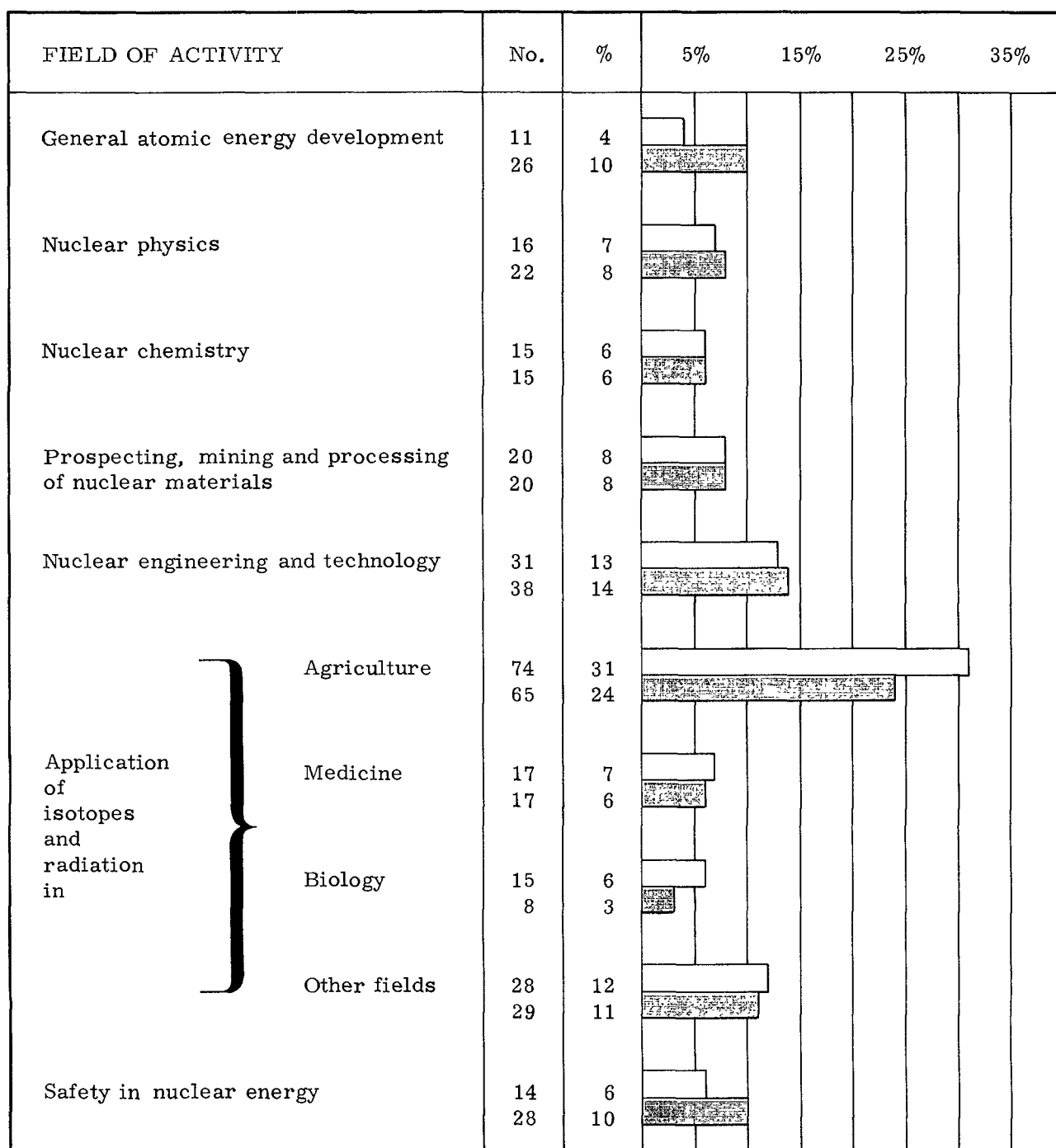
53. A 1972:1973 comparison is given below of the amount of assistance provided in what were the top five fields of activity in 1973. Numerical data for all ten fields of activity are given in Figs 2A, 3A and 4A (which also include comparable data for 1972), in Fig. 5A and Table 5.

Assistance by field of activity and type: 1972 and 1973
(in thousands of dollars)

Field of activity	Year	Experts	Equipment	Fellowships	Share of total programme	
		\$	\$	\$	\$	%
Application of isotopes and radiation in agriculture	1972	530.9	512.1	391.1	1434.1	26.1
	1973	496.7	508.0	437.8	1442.5	25.0
Nuclear engineering and technology	1972	203.8	284.7	370.2	858.7	15.6
	1973	208.3	350.0	351.6	909.9	15.8
Other fields of application of isotopes and radiation	1972	173.2	261.2	83.4	517.8	9.4
	1973	213.6	448.7	168.5	830.8	14.4
Nuclear physics	1972	93.6	89.8	285.6	469.0	8.6
	1973	150.6	152.0	250.9	553.5	9.6
Application of isotopes and radiation in medicine	1972	178.7	210.5	184.8	574.0	10.5
	1973	152.3	217.4	165.5	535.2	9.3
Total	1972	1180.2	1358.3	1315.1	3853.6	70.2
	1973	1221.5	1676.1	1374.3	4271.9	74.1
Total assistance	1972	1840.2	1922.1	1730.4	5492.7	100.0
	1973	1926.5	2055.3	1782.6	5764.4	100.0

FIGURE 2A

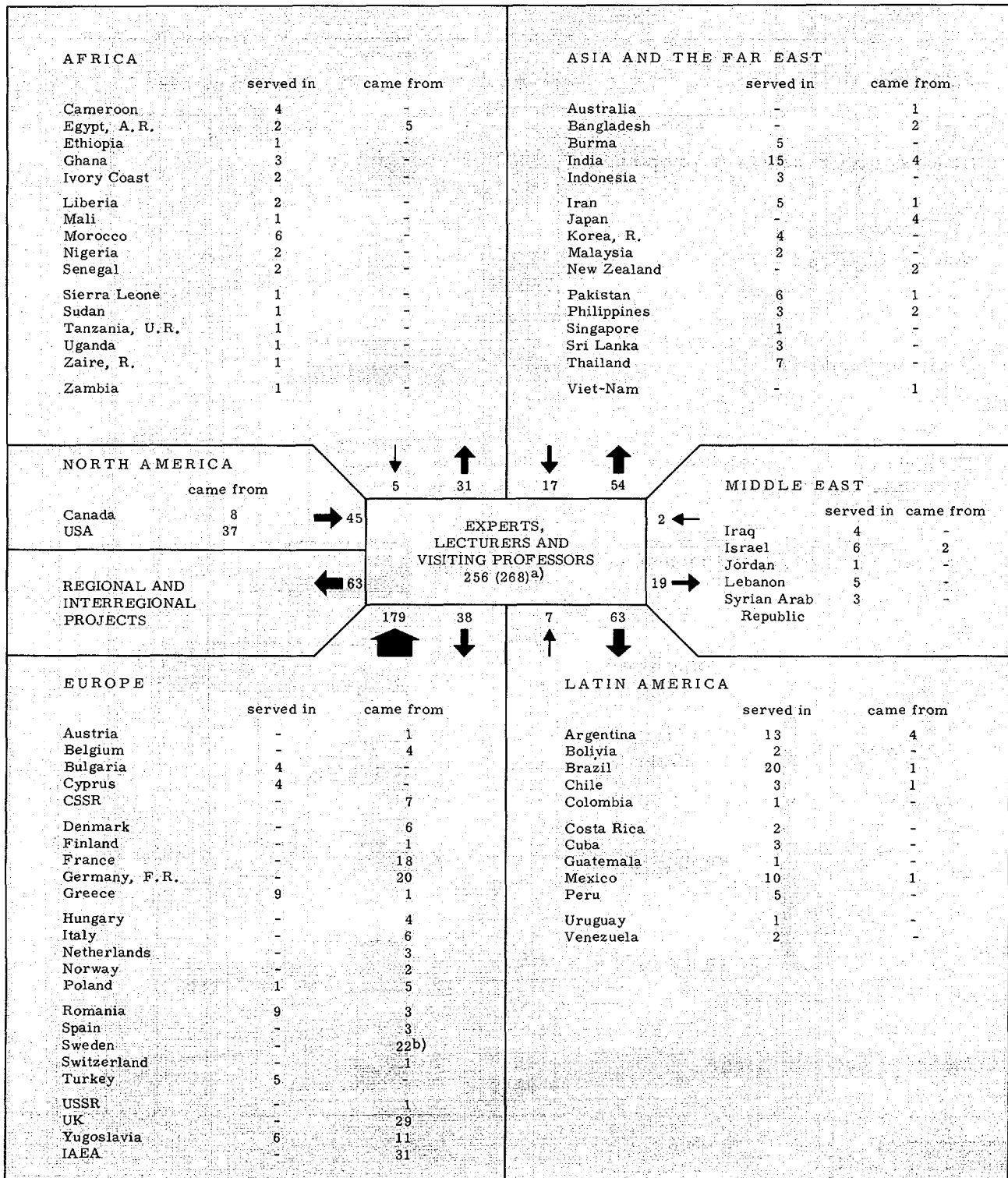
DISTRIBUTION OF EXPERT SERVICES BY FIELD OF ACTIVITY: 1972 and 1973



Note: The figures in the second and third columns of the chart indicate the number of expert assignments and the corresponding percentage share, by field of activity, of total expert services provided.

FIGURE 2B

DISTRIBUTION OF EXPERT SERVICES BY REGION: 1973

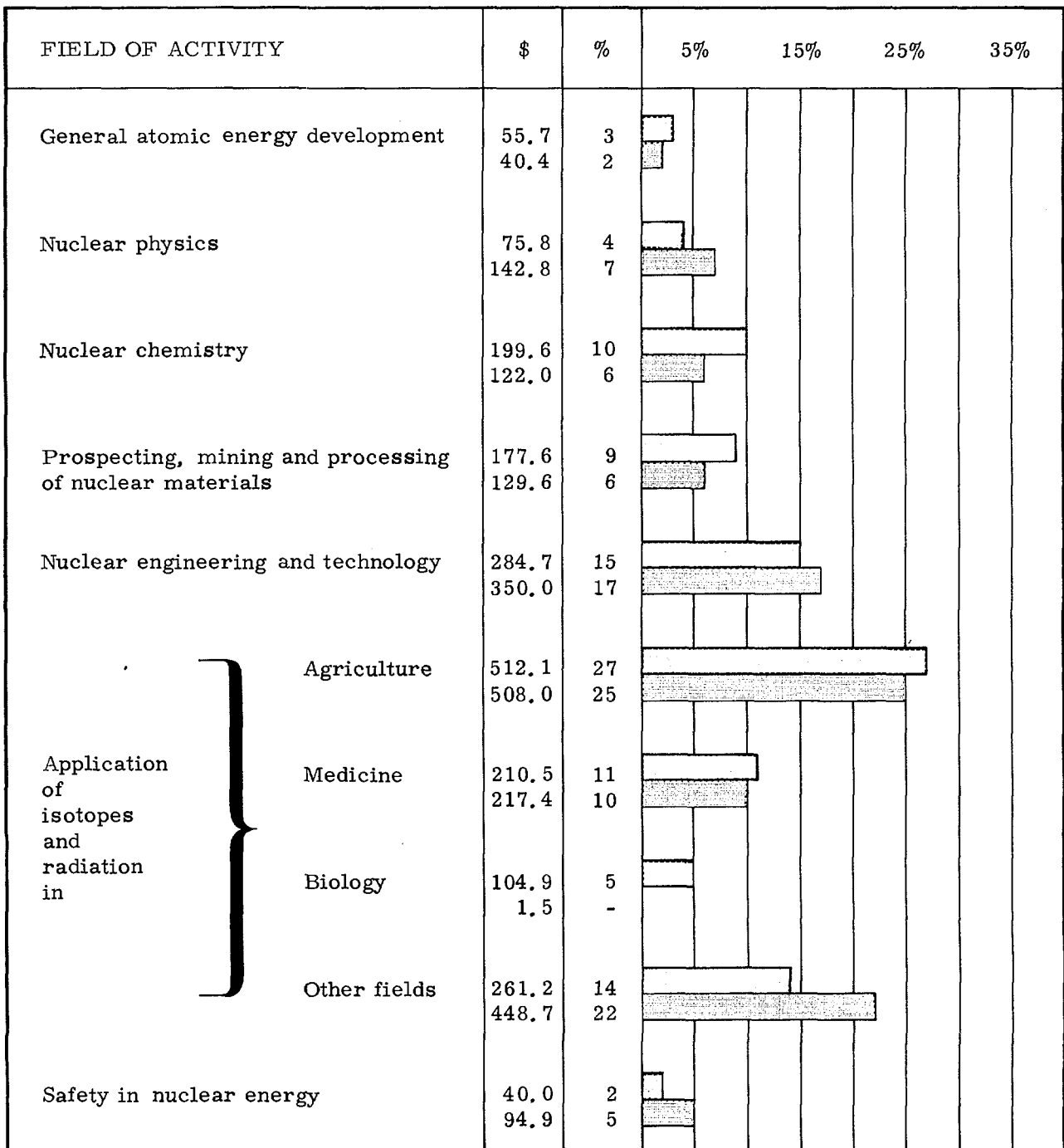


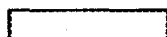

a) The difference in the number of assignments (268) and the actual number of experts is due to the fact that nine experts served in two and one in four different countries.

b) Includes ten lecturers for a SIDA-financed training course, as follows: from Denmark, one; Poland, one; Sweden, one; United Kingdom, four; Yugoslavia, one; IAEA, two.

FIGURE 3A

DISTRIBUTION OF EQUIPMENT BY FIELD OF ACTIVITY: 1972 and 1973
(in thousands of dollars)

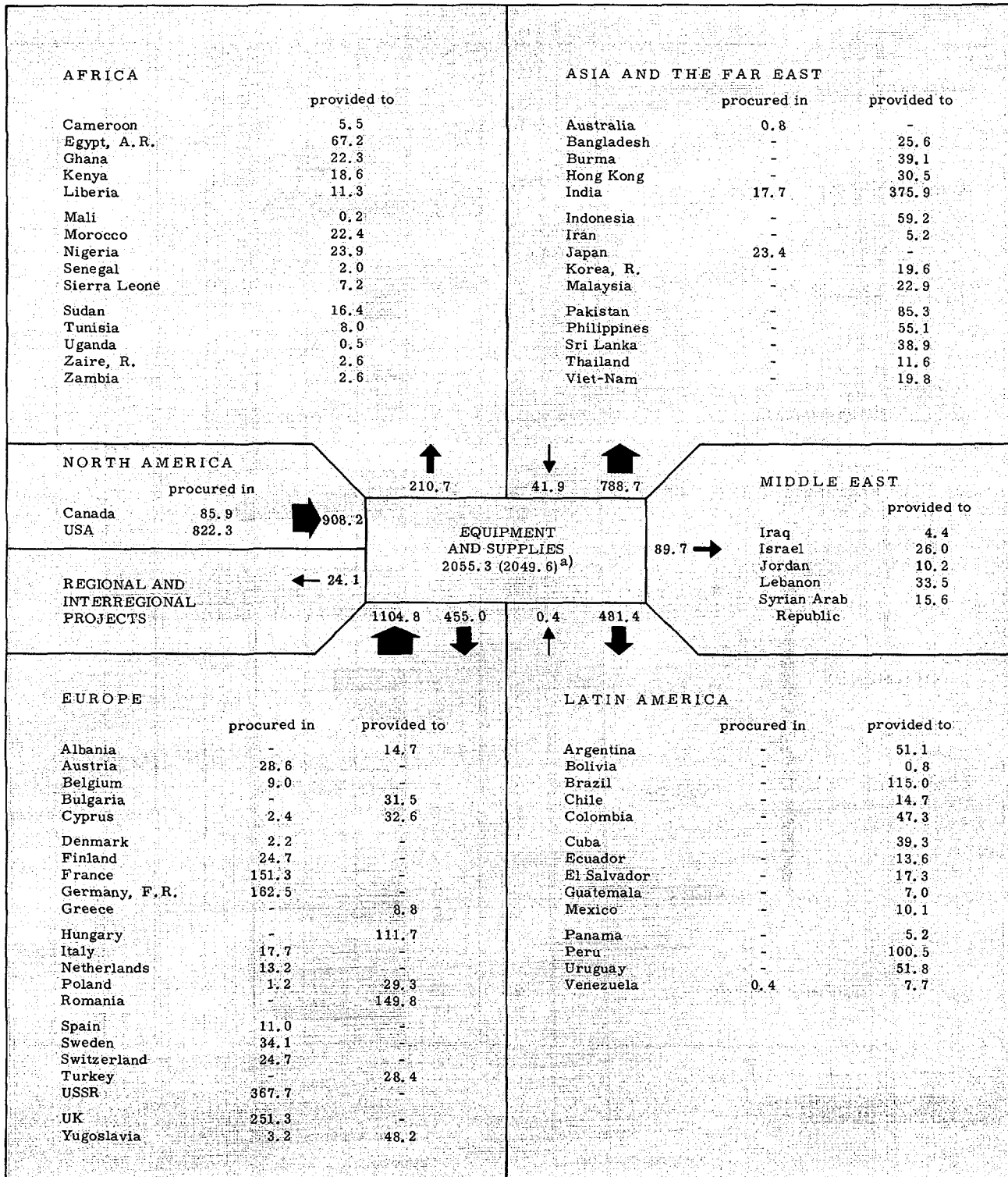


 1972
 1973

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

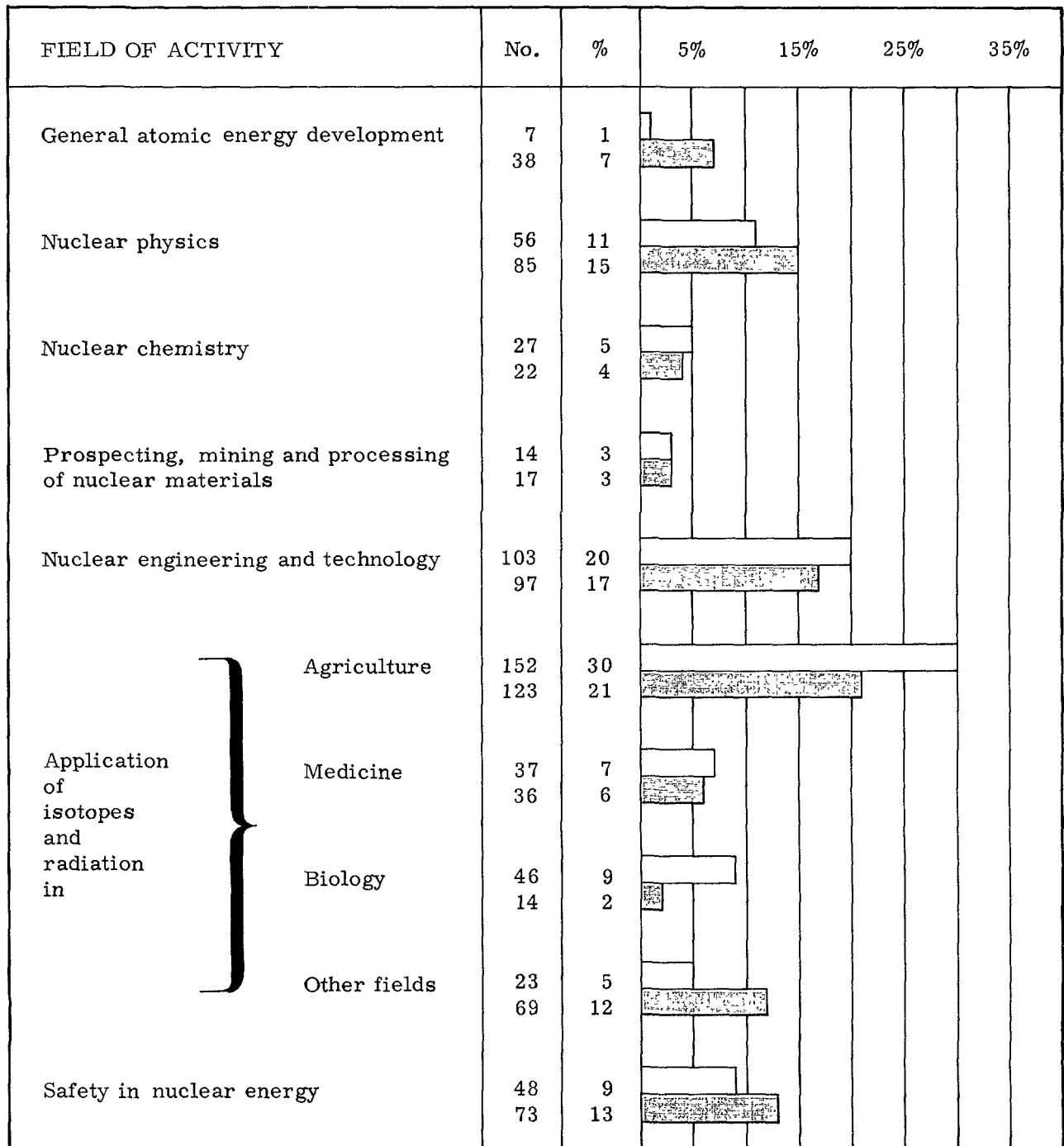
DISTRIBUTION OF EQUIPMENT BY REGION: 1973
(in thousands of dollars)



a) Does not include miscellaneous charges amounting to \$5700.

FIGURE 4A

DISTRIBUTION OF FELLOWSHIP AWARDS BY FIELD OF ACTIVITY: 1972 and 1973

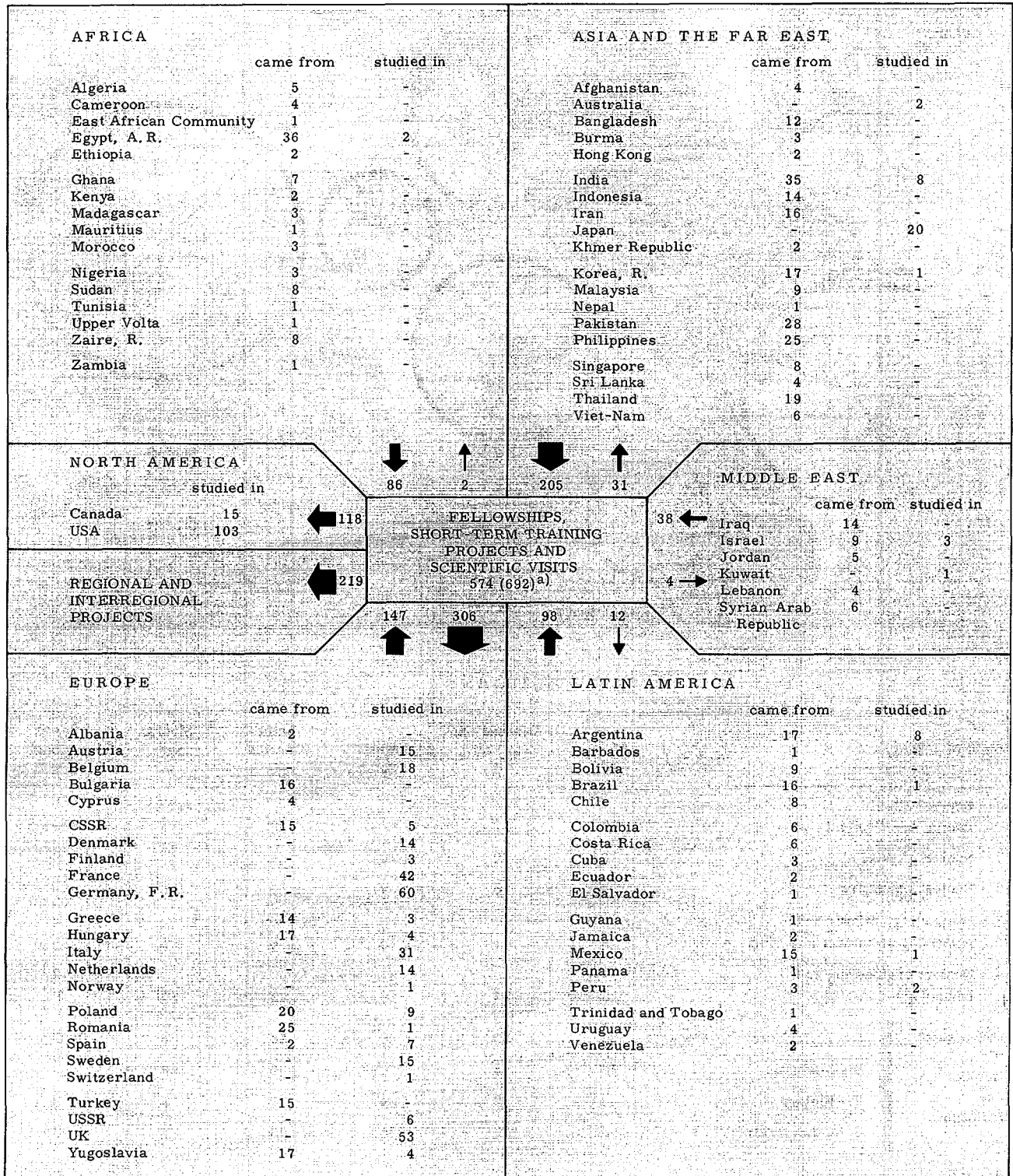


1972
 1973

Note: The figures in the second and third columns of the chart indicate the number of fellowship awards and the corresponding percentage share, by field of activity, of the total number of fellowships awarded.

FIGURE 4B

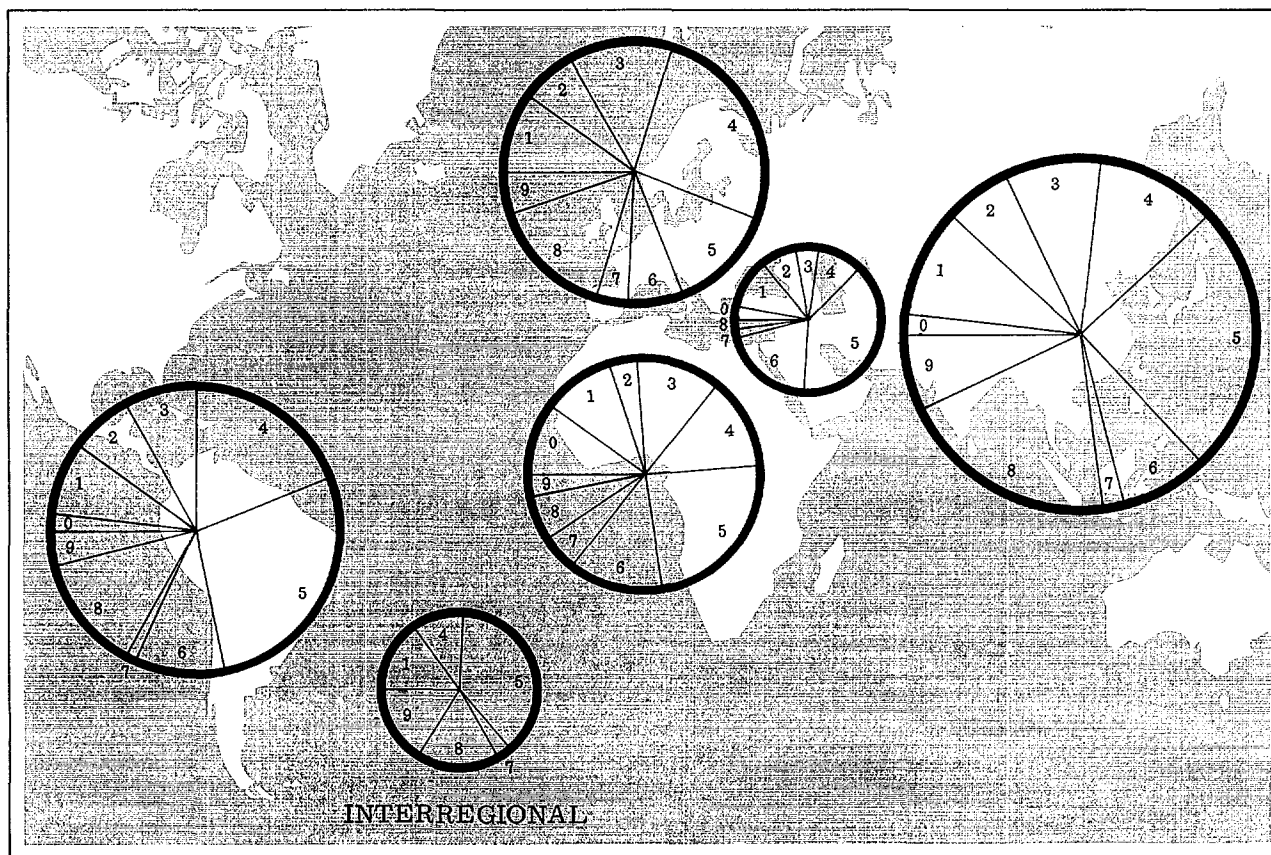
DISTRIBUTION OF FELLOWSHIP AWARDS BY REGION: 1973



a) The difference between the number of awards (574) and the number of places of study (692) is due to the fact that nine fellows studied in two, five in three, one in four, three in five and three in seven different countries, whereas eight holders of awards for scientific visits went to two, three to three, five to four, four to five, three to six and one to seven different countries.

FIGURE 5A

DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD OF ACTIVITY AND REGION: 1973^{a)}



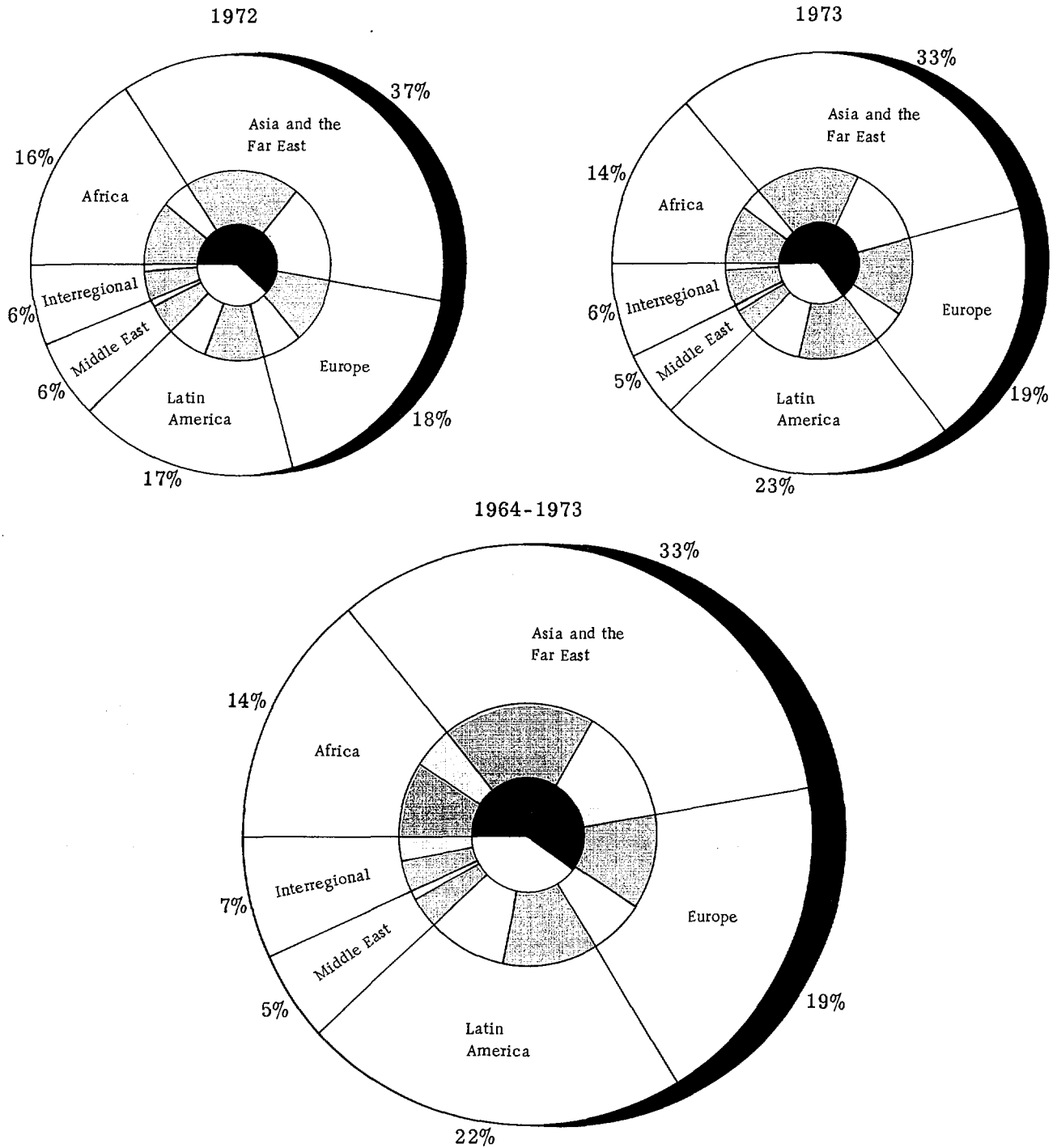
SUMMARY

Field of activity	Africa %	Asia and the Far East %	Europe %	Latin America %	Middle East %	Inter- regional %
0 - General atomic energy development	10	2	-	2	3	-
1 - Nuclear physics	10	10	10	8	11	15
2 - Nuclear chemistry	4	6	7	7	8	-
3 - Prospecting, mining and processing of nuclear materials	12	9	13	8	5	-
4 - Nuclear engineering and technology	13	11	26	19	10	11
Application of isotopes and radiation in	5 - Agriculture	24	25	13	28	38
	6 - Medicine	13	8	7	10	-
	7 - Biology	5	2	4	1	2
	8 - Other fields	6	20	15	13	2
9 - Safety in nuclear energy	3	7	5	4	-	16
	100%	100%	100%	100%	100%	100%

a) 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 5B

DISTRIBUTION OF TECHNICAL ASSISTANCE BY REGION AND SOURCE
(1972, 1973 and 1964-1973)

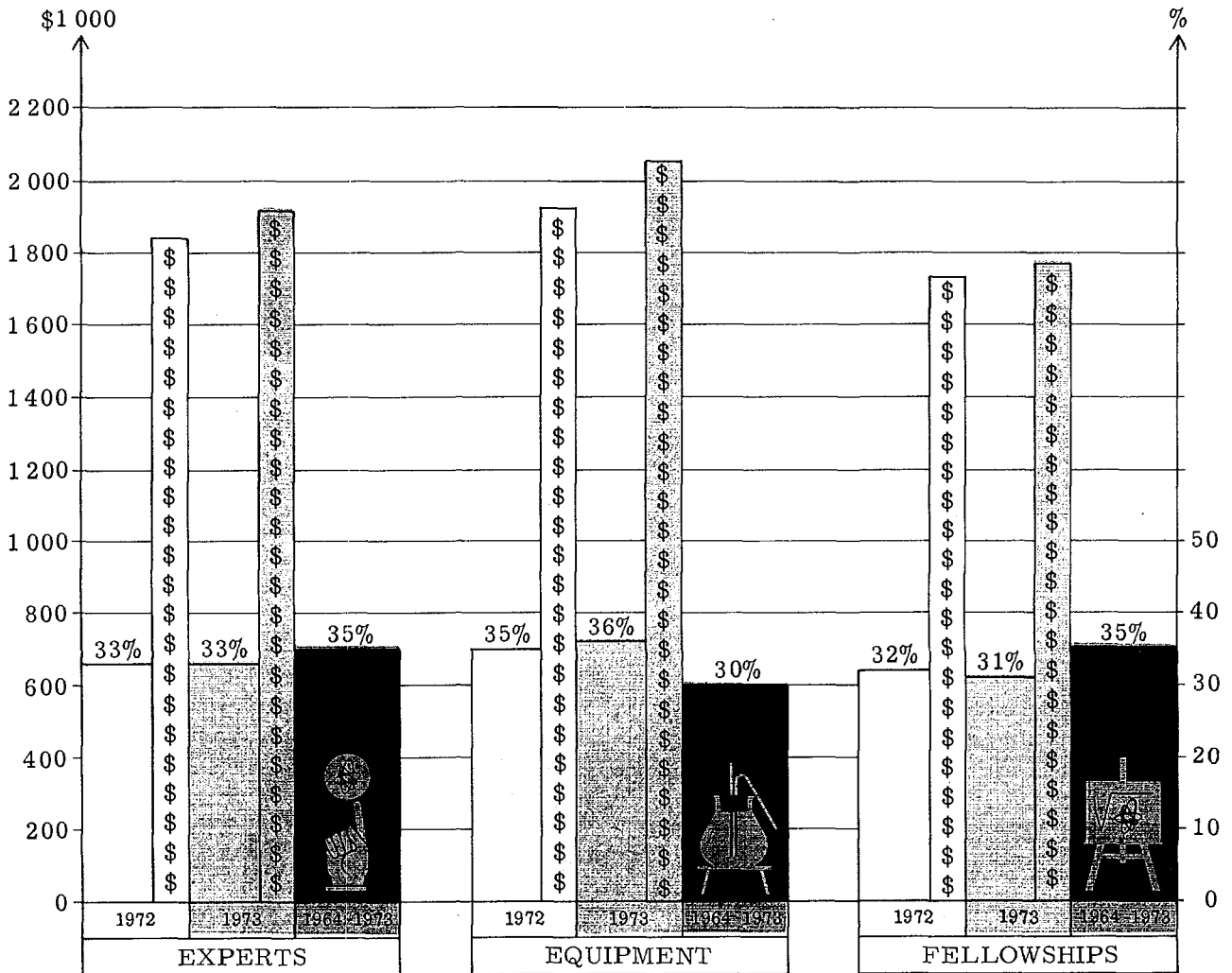


LEGEND (distribution of technical assistance by source):

INNER RING (regional distribution)	INNER CIRCLE (overall distribution)	1972	1973	1964-1973
Regular programme	Regular programme	62.2%	65.3%	60.4%
UNDP	UNDP	37.8%	34.7%	39.6%

FIGURE 6

DISTRIBUTION OF TECHNICAL ASSISTANCE BY TYPE OF ASSISTANCE
(1972, 1973 and 1964-1973)



TYPE	1972		1973		1964-1973	
	%	\$1 000	%	\$1 000	%	\$1 000
EXPERTS	33	1 840.2	33	1 926.5	35	13 521.0
EQUIPMENT	35	1 922.1	36	2 055.3	30	11 512.1
FELLOWSHIPS	32	1 730.4	31	1 782.6	35	13 233.5
TOTAL	100	5 492.7	100	5 764.4	100	38 266.6

Note: Fellowships include participants in short-term training projects.

2. By region and country

54. Information on the distribution of technical assistance by region is summarized in Figs 5A and 5B. As in 1972, more countries in Africa - namely, 20 - received Agency assistance than in any other region; 16 States in Latin America received country programme assistance from the Agency in 1973, followed by the regions of Asia and the Far East, Europe and the Middle East with 15, 11 and 5 country programme recipients respectively. Eight additional countries - two in Africa, two in Asia and the Far East, three in Latin America and one in Europe - participated in the Agency's programme of intercountry short-term training projects.

55. In 1973, 75 countries and one regional organization received technical assistance from the Agency, as compared with 71 countries and one regional organization in 1972. Including those which acted as hosts for short-term training projects and scientific visits, 26 countries both received and provided assistance in 1973 (22 in 1972). Eighteen countries provided but did not receive technical assistance in 1973 (19 in 1972), and, as in 1972, 49 countries were recipients only. Thus, 93 countries (90 in 1972) participated in the Agency's technical assistance programme in 1973. Figs 2B, 3B and 4B and Table 3 show the extent to which skills and knowledge were exchanged between countries.

3. By type of assistance

56. As shown in Fig. 6, the distribution of technical assistance in 1972, 1973 and over the period 1964-1973 by type, was as follows:

<u>Period</u>	<u>Experts</u>	<u>Equipment</u>	<u>Fellowships</u>
1972	33%	35%	32%
1973	33%	36%	31%
1964-1973	35%	30%	35%

The growing number of Agency-executed UNDP large-scale projects, which frequently have substantial equipment components, has accelerated the trend of allocating a gradually increasing share of funds for the provision of equipment. The average share of the total assistance provided that was devoted to equipment was 23% over the ten-year period 1960-1969, 26% over the period 1962-1971 and has now reached the 30% mark.

(a) Experts, lecturers and visiting professors

57. In 1973, 256 experts, lecturers and visiting professors from 37 countries served a total of 790 man-months at a cost of \$1 926 500; the comparable data for 1972 are: 232 experts, lecturers and visiting professors from 32 countries provided 792 man-months of assistance at a cost of \$1 840 200. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1973 totalled \$612 600 for expert services. Nine experts each served in two countries, one expert served in four countries, and 193 experts were assigned to one country only. A total of 51 countries (54 in 1972) were provided with country programme experts and visiting professors, and an additional 63 experts and lecturers (46 in 1972) assisted 11 intercountry projects (31 partly cost-free and 15 cost-free experts and lecturers were provided, as compared with 17 partly cost-free and 11 cost-free experts and lecturers in 1972). Experts' final reports which became available in 1973 are listed in Annex V.

58. Some typical difficulties encountered by the Agency in recruiting experts for field posts were mentioned in last year's report, [9] A recent study of the situation has brought to light the differences between the type of experts the Agency needs to recruit and those recruited

[9] Ibid., paras 42 and 43.

by most of the other agencies in the United Nations system. These differences can be summarized as follows:

- (a) The experts recruited by the Agency are mostly scientists and the assistance they are hired to provide is usually highly specialized; thus, the Agency recruits experts by "technique" and not by broad subject area;
- (b) Agency experts have full-time positions in their home country atomic energy commission, governmental department, hospital, industrial concern, research centre or university, and are not part of the widening pool of "career" experts - on which other agencies depend more and more - who no longer have strong ties with a former employer in the home country;
- (c) Agency experts are drawn from relatively small groups of specialists who know each other through personal contacts at meetings (conferences, panels, seminars, study groups, symposia, training courses, etc.) and articles in scientific journals. Some groups overlap within the nuclear "club", which widens the circle of acquaintanceships among those persons who are cast in the role of "technical officer" at the Agency's Headquarters, "expert" in the field, or "counterpart technical officer" on a project receiving Agency assistance. That these roles may be interchangeable is not unique; however, the degree of familiarity among the persons filling the roles is considered to be peculiar to the situation at the Agency; and
- (d) Most Agency expert assignments are of relatively short duration and involve consultancy work, whereas operational direction and control often constitute the principal duties of the experts recruited by other agencies.

59. The differences mentioned above have obvious advantages and disadvantages. In most cases the men in charge of projects in the developing countries know whom they want for specific expert assignments, which simplifies recruitment provided the requested specialist can be made available. If the requesting country's first choice cannot be obtained for the assignment, the counterpart technical officer may be loath to accept a substitute candidate about whom little is known. It is primarily because of this situation that as many as ten candidates may have to be contacted before the Agency can fill a vacant expert post.

60. The chronic problems experienced in recruiting Agency experts are:

- (a) Finding specialists for short assignments who can be made available when the requesting country needs them;
- (b) Obtaining the clearance of expert candidates by requesting countries faster, so as to reduce the number of cases of candidates who learn of the Government's acceptance too late to be able to take up the assignment, thereby obliging the Agency to search for new candidates; and
- (c) Finding scientists who can be released from their duties to take up expert assignments of one year or longer duration.

It is felt that this situation can hardly be expected to improve in future unless the more advanced Member States take special measures to make the required staff available as consultants and experts for the work to be done under the Agency's programme of technical co-operation, in which the developed and developing countries meet as partners.

(b) Equipment and supplies

61. Including the value of grants of equipment delivered during 1973, 56 countries and six intercountry projects (54 and 20 respectively, in 1972) were provided with equipment and supplies to a value of \$2 055 300, which represents an increase of 6.9% over the amount of

\$1 922 100 provided in 1972, and is the largest amount of equipment provided by the Agency in any one year. An additional amount of equipment and supplies valued at \$1 423 400 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. In Fig. 7B, illustrating trends over the period 1964-1973, it can be seen that the value of the equipment provided in 1973 was more than twice greater than ten years earlier.

62. As in previous years, efforts were made to spread the purchases of technical assistance equipment and supplies over a large number of Member States. In 1973 those items were procured in 22 countries (in 1972, in 20 countries), as shown in Fig. 3B, which also includes financial data in respect of equipment grants.

63. The problems associated with equipment procurement and maintenance have been explained in detail a number of times, for example, in last year's report [10], but have not yet been resolved. A recurring cause of time-consuming correspondence with requesting countries and a source of delay in procurement is the lack of sufficient information about the items of equipment needed. The list of equipment and supplies that is attached to technical assistance requests is often drawn up on the basis of information extracted from the catalogue of one supplier. Irrespective of whether or not the supplier's name and the date of the catalogue are cited, the request should - but usually does not - indicate in detail the kind of work for which the items are needed and whether the manufacturer's specifications measure up to actual requirements. Furthermore, as several "small" items, taken together, make it necessary for the Agency to seek competitive bids, it is essential that the Agency's procurement section knows whether similar goods from other suppliers would also be acceptable. The Agency has prepared special printed forms (available in English, French and Spanish language versions) for the recording of this information, and, although numerous institutes provide adequate information for the processing of equipment requests, the co-operation of others in the thorough completion of these forms would not only be helpful, but would speed up procurement action and, thus, benefit all concerned.

(c) Fellowships

64. A total of 574 candidates from 66 countries and a regional organization received fellowship awards under the training programme in 1973 (see Fig. 4B and Tables 3 and 6) as against 513 candidates from 61 countries and a regional organization in 1972. The number of man-months of training awarded was 3252 in 1973 as against 3221 in 1972. The higher number of fellowship award holders in 1973 was due mainly to increases in the number of awards for individual study financed from UNDP funds (68 in 1973 and 31 in 1972), for training course participation and for scientific visits.

65. Due to the large number of award holders under prior years' programmes who studied in 1973, the value of the training provided by the Agency in 1973 is the highest on record for any one year, namely, \$1 782 600, as compared with \$1 730 400 in 1972. The 1973 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 1973, amounting to \$1 438 400. This amount is more than \$200 000 higher than the combined total of these two items at the end of 1972 and holds promise of a training programme amounting to about \$1 900 000 in 1974.

66. A comparison of the nominations and awards for country programme fellowships in 1972 and 1973 and of all technical assistance awards made during these two years is given

[10] Ibid., paras 57-59.

below. The number of scientific visit awards more than doubled and those for short-term training projects rose by about 20%.

<u>Country programme awards</u>	<u>1972</u>		<u>1973</u>	
Nominations received		475		526
Effective awards [11]				
Individual projects	306		321	
International projects	<u>19</u>	325	<u>10</u>	331
Percentage of nominations which led to effective awards		68.4%		62.9%
<u>Intercountry programme awards</u>				
Scientific visits	16		40	
Short-term training projects	<u>172</u>		<u>203</u>	
Total awards	513		574	

67. The decrease from 68.4% in 1972 to 62.9% in 1973 in the percentage of nominations which led to effective awards is due to a number of factors. From the comparison given below, however, it can be seen that 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, or because the training requested was not related to the peaceful application of nuclear energy. There was also a sizable increase in 1973 in the number of candidates who were withdrawn and, thus, were not available to take up fellowship awards.

Nominations not resulting in effective awards in 1972 and 1973

	<u>Number</u>		<u>Share of total nominations received</u>	
	<u>1972</u>	<u>1973</u>	<u>1972</u>	<u>1973</u>
Not selected because of the candidate's lack of qualifications or experience, or because the requested field of training was not in the Agency's area of competence	30	96	6.3%	18.2%
Withdrawn on the initiative of the nominating Government (before or after award)	35	64	7.4%	12.2%
Not resulting in awards owing to the lack of funds or appropriate training openings	85	35	17.9%	6.7%
Total	<u>150</u>	<u>195</u>	<u>31.6%</u>	<u>37.1%</u>

[11] Total number of awards less withdrawals after award as at 31 December 1972 and 31 December 1973, respectively.

(d) Regional and interregional activities

68. In 1973, the Agency conducted 11 intercountry training projects in 11 different countries, in which there were 244 participants from 64 different countries and a regional organization. The cost of attendance of 203 participants from 63 countries and the regional organization was paid out of project funds (cash and in kind resources under the Agency's regular programme and under UNDP); the cost of attendance of 41 participants, including 34 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 203 awards financed from Agency resources.

69. Seven of the 11 intercountry training projects related to the application of isotopes and radiation (three in agriculture, two in hydrology, one in industry and one in medicine); in addition there was one project in the maintenance and repair of nuclear electronic equipment, one in radiological protection, one in the technical and economic aspects of nuclear power development, and one in waste management and environmental protection. Further details on the location, attendance, financing, etc. of these projects are given in Annex III.

(e) Follow-up missions

70. In 1973 four one-man missions were sent to the regions to determine needs and discuss development plans with requesting countries. The cost of sending staff members on these missions averaged \$387 for each of the 16 countries visited.

C. UNDP LARGE-SCALE ASSISTANCE ACTIVITIES

1. General

71. The modest "seed money" technical assistance of the regular programme type provided in small instalments over the years, to satisfy needs which Governments could not meet for lack of funds, has strengthened institutions in the recipient countries and enabled them to make a larger contribution towards economic and social development in their respective countries. In a growing number of cases these institutions are being selected to become the Government's counterpart organization to the Agency for the purpose of implementing UNDP large-scale assistance to projects in the developing countries. Designed to make an early impact in the recipient country, this large-scale assistance provided through the Agency is primarily of the pre-investment type or is for the demonstration of nuclear techniques and modern technology, or involves a combination of both of these. Projects for which pre-investment assistance is provided through the Agency include power surveys as well as projects involving the prospection for and evaluation of national nuclear raw materials resources. The latter projects also involve the demonstration of nuclear techniques and technology; examples of projects of this type for which the Agency has provided large-scale assistance are the nuclear research projects in agriculture in Brazil and India (now being completed) and in Yugoslavia (completed at the end of 1966), and the non-destructive testing centre in Argentina. The increasing importance of large-scale assistance in the overall technical co-operation activities of the Agency can be seen from the following comparison: ten years ago the large-scale assistance provided by the Agency totalled \$294 200 or less than 10% of the total assistance provided in 1964, as against \$1 269 000 or 22% of the total assistance provided in 1973. Details are given below of the large-scale assistance currently being provided through the Agency with a view to bringing up to date the information provided in last year's report [12].

[12] GC(XVII)/INF/142, paras 68-76.

2. Nuclear research in agriculture in India

72. The Nuclear Research Laboratory at the Indian Agricultural Research Institute in New Delhi is now fully operational and showing promise of achieving its anticipated potential as a leader in applied research in the agricultural sector. The work on the production and testing of vaccine against lung-worm in sheep continues to make good progress at the Indian Veterinary Research Institute, and the programmes involving the use of nuclear techniques at the National Dairy Research Institute have yielded significant economic benefits. Mutation breeding work at the Bhabha Atomic Research Centre (BARC) has resulted in the selection of numerous mutants for evaluation in co-ordinated trials conducted simultaneously in as many as 14 different locations in India; other high-yielding varieties developed by BARC have already been released for general cultivation. In addition to giving technical support to other project activities, scientists at BARC have also conducted a number of interesting studies on the control of insect pests. Large-scale assistance to this project is scheduled to be completed in 1974.

3. Uranium exploration in Greece

73. The first (reconnaissance) phase of the project was completed at the end of 1973, during which numerous areas were identified that merit detailed exploration for uranium and base metals. During the second phase the project staff will devote its efforts exclusively to exploring for uranium in the areas considered likely to yield sizable tonnages of "low cost" uranium ore that can be mined and processed without financial loss. The base metal discoveries are also certain to make a positive impact on the country's economy.

4. Uranium exploration in Pakistan

74. Despite adverse operating conditions in 1973 - for example, heavy rains washed out access roads, adding to the difficulty and delay experienced in moving equipment to proposed drill sites - exploration has revealed the existence of uranium ore deposits in what had previously been classified as a potentially favourable area. Accordingly, given additional well-prepared exploration work, there are reasonable prospects that substantial ore deposits of economic value will be located and that additional UNDP large-scale assistance to the project will be provided under a Phase II operation during the 1974-75 and 1975-76 field seasons.

5. Nuclear power study in the Philippines

75. This second feasibility study on the economics of nuclear power was completed during the first half of 1973, and the subcontractor's report was submitted to the President of the Philippines on 31 July. The President immediately requested the National Economic and Development Authority to initiate the necessary follow-up action; this may well result in the first instance of the introduction of nuclear power in a developing country on the advice of the Agency.

6. Demonstration plant for irradiation sterilization of medical products in India

76. This facility was designed and constructed on a subcontract basis, the civil engineering work being done by the Indian authorities. The demonstration plant features dry loading and storage of the radiation source; it was commissioned, as scheduled, at the end of 1973 and commenced commercial operation in January 1974. The market research undertaken so far makes it possible to predict a growing demand for sterilized medical products and, thus, for the services of the plant.

7. Nuclear research in agriculture in Brazil

77. Extensive work is being done in the soil sciences, the study of plant nutrition, biochemistry and pathology. A major portion of all of these activities is devoted to finding ways and means of increasing the production of beans, one of the country's most important food crops. Research in entomology is designed to combat insect pests that damage beans, citrus fruit and sugar cane. Plant breeding, involving the use of nuclear techniques, is being carried out to improve crops such as beans and rice. Other activities include work in the animal sciences, pesticide tracer studies and fertilizer and water utilization investigations.

8. Development of nuclear technology in Romania

78. The expansion of the work programme of the Institute of Nuclear Technology in Romania is well under way. For the first time, the Agency will arrange for the provision of a number of experts and of some fellowship training under a subcontract. Irradiation trials of materials and fuel elements fabricated at the Institute will also be carried out under a subcontract, as will post-irradiation quality control work. Good progress is being made in all areas of project implementation.

9. Non-destructive testing and quality control in Argentina

79. Interest in the work being done by the group of Argentine specialists in respect of non-destructive testing (NDT) and quality control for industry is growing as more and more companies and industries learn of the services which the centre is prepared to provide, including those of a competently staffed mobile laboratory. One example is that of the hydroelectric authorities who want NDT tests to be run on turbine blades on site, so as to be able to detect cracks and determine how long cracks may become before a turbine has to be put out of service for repair.

10. National nuclear energy centre in Chile

80. Considerable difficulties were experienced in the initial stages of providing assistance to this project, due to the fact that the Agency's consultant was unable to negotiate early agreement to a satisfactory work plan. Such an agreement has now been reached, and the project document has been signed. It is anticipated that as many as nine experts, including the Project Manager, will be assigned to the project in 1974, the year in which the Chilean research reactor is scheduled to be commissioned. In addition to providing advice on the production of radioisotopes to meet local needs, the Agency's consultants will assist their counterparts in carrying out work programmes in radiochemistry, nuclear medicine, nuclear engineering, physics and biophysical research.

11. Radioisotope applications in Zambia

81. Assistance is being provided to the National Council for Scientific Research to establish a radioisotope advisory service which should be available to all technical departments of the Government. The completion of the construction of a block of laboratories in 1973 has greatly enhanced the capability of the Radioisotope Unit to achieve its objectives. The Unit was mainly concerned in 1973 with isotope hydrology work in connection with ground water investigations and sedimentation and pollution studies, assisting the nuclear medicine facility at the university in carrying out routine diagnostic procedures, and plant physiology research on ground-nuts.

12. Radiation dosimetry in the Arab Republic of Egypt

82. The Agency has been requested to assist the Atomic Energy Establishment, through the provision of expert services, equipment and fellowships, in carrying out laboratory investigations of the most reliable techniques for the determination of the intensity of neutron and gamma rays released into the environment, and the concentration of radio-

activity in the air, in the event of a radiation accident. In 1973 the Agency provided specialized instruments and fellowship training in support of this radiation protection project which is to be assisted over a period of four years.

13. Radiation processing facility in the Republic of Korea

83. The establishment of the proposed facility will make it possible to test the feasibility of the radiation processing of relatively small, prepackaged articles and of bulky materials. Various disposable medical products, which are radiosterilized, and wooden objects impregnated with a vinyl monomer, which are irradiated, are examples of products in the first category. Surface-coated sheets of plywood, plastic-impregnated panel boards and flooring made from locally produced fibres and plywood waste material, which are subjected to radiation processing, are items in the second category. The qualitative improvement in end products, which is possible through radiation processing, can prove to be extremely valuable in consolidating existing and securing new markets. Achieving this goal is of special importance to the Korean plywood industry, which exports up to 80% of its production. The project staff will also train local technical staff in the design, construction and operation of irradiation equipment for industrial applications.

14. Use of radioisotopes in agriculture in Morocco

84. The project is designed to train laboratory staff in the use of nuclear techniques in agricultural research and develop methods for increasing the yield of important plant varieties such as sugar beets, wheat, cotton, maize and sunflowers through the optimum utilization of fertilizers and water. The research results will be tested at experimental stations throughout the country and communicated by the Ministry of Agriculture to other governmental offices for necessary follow-up action.

D. EVALUATION OF TECHNICAL ASSISTANCE PROGRAMMES

1. General

85. The need for the continuing evaluation of the effectiveness of multilateral aid, including the technical assistance provided by the Agency, has long been apparent, and all organizations in the United Nations system carry out evaluation as a matter of priority. This priority is reflected in the processes involved in providing technical assistance; evaluation has been considered and defined in the "Study of the Capacity of the United Nations Development System" [13]. In view of the importance attributed to evaluation by the donor countries, the recipient Governments and the agencies providing multilateral aid, it is useful to outline the background of the evaluation process and how it has been applied by the Agency, beginning with the initiation of its technical assistance programme in 1959.

86. There are four evaluation stages. The first stage is project formulation, when the Agency, in close collaboration with Governments, considers the requested assistance in the light of a country's overall economic and social development, detailed information on the purposes and scope of a proposed activity, as well as the objectives which it is intended to achieve. Already in 1959 it was evident to the Agency that project formulation could not be effectively attempted in the absence of reliable background information for planning and programming. The stage of development of atomic energy programmes in the developing countries was virtually unknown, and a series of preliminary assistance missions was therefore dispatched between 1959 and 1962. It was their task to establish contacts with governmental organizations, universities, research establishments and other institutions that either were known to use or planned to introduce nuclear techniques or - in the few cases where it happened - had been delegated responsibility for the development of nuclear energy for peaceful purposes in the country.

[13] United Nations document DP/5.

87. Nine preliminary assistance missions visited 45 countries, and ascertained, on a sectoral basis, the stage of development of the use of nuclear techniques and those areas in which Agency assistance could be effectively utilized. The dispatch of these multi-disciplinary teams of 5-6 experts was an innovation in multilateral aid and, in fact, laid the foundation on which all Agency technical assistance was subsequently provided. Later many Member States expressed the view that it would be valuable if the findings of the preliminary assistance missions could be up-dated by smaller follow-up missions. Over the period 1961-1966, 12 follow-up missions visited 32 countries. The information gathered by the members of these missions ensured that the Agency's technical assistance programmes were planned and carried out with as full a knowledge as possible of the plans of the requesting countries and also that there was no duplication of aid from other sources.

88. At about the same time the Secretary-General of the United Nations organized teams to carry out pilot evaluation projects in a limited number of countries, in consultation inter alia with the specialized agencies and the IAEA, to evaluate all of the assistance provided by the organizations in the United Nations system. The Agency participated in the work of these teams to the extent necessary, and, by 1968, five such missions had reported. The most important conclusion reached was that it was essential that Governments should devote more attention to adequate programme and project planning, as well as to the co-ordination of resources, when formulating requests for external aid. This was a conclusion reflected in the reports of the Agency's preliminary assistance and follow-up missions, which were concerned primarily with the formulation of requests for Agency assistance and ensuring that such assistance was in keeping with national development plans. Thus, at the project formulation stage the Agency has been involved in the evaluation process in one form or another.

89. The second stage is the appraisal of a request by the Secretariat; this includes the assessment of the technical feasibility of the use of nuclear techniques. The process involves the determination of the appropriate timing of the use of Agency and Government resources, and the assessment of the suitability and availability of appropriate counterpart support facilities. (The content of the Agency's technical assistance programme for a given year emerges from the appraisal of requests, which has been carried out in close co-operation with the Governments concerned.) Questions relating to individual requests which could not be clarified by correspondence, have, on occasion, been the subject of individual reports by specially appointed consultants or Headquarters staff, following a visit to the country, or have been referred to Agency experts in the field or other United Nations personnel in the country for clarification. This stage may be said to culminate with the discussions held annually with representatives of 25-30 recipient Member States at the time of the Agency's General Conference, in which agreement on the general form and nature of the Agency's technical assistance to Governments in carrying out their development plans over the next few years is reached. This process has become an integral part of the Agency's technical assistance programme.

90. Once this agreement has been reached and the technical assistance to be provided has received the approval of the Board of Governors, the third stage of evaluation, operational control, begins. This is the activity or process by which proposed accomplishments, scheduled activities and budget expenditures are reviewed to determine whether progress has been satisfactory. It involves financial reviews to detect delays in the scheduled arrival of experts or equipment, or both, and the award of fellowships; the monitoring process involved is laid down in the reporting procedures for Agency project managers and experts. In the case of large-scale UNDP assistance to developing country projects (those with a UNDP contribution of \$100 000 or more) or assistance extending over several years, provision is automatically made in the project design for periodic reviews of project implementation by representatives of the recipient Government, the Agency and UNDP, assisted by consultants on occasion. Small-scale UNDP assistance to projects, usually involving the provision of the services of one expert for relatively short periods of time, is monitored by means of the routine progress reports of the experts.

In the case of the Agency's regular programme, another invaluable source of programming information, in addition to the progress reports of Agency experts in the country, is the annual formulation of the assistance to be provided under the next year's programme, which automatically calls for a review of previous and on-going assistance to projects in the country concerned.

91. Since effective operational control depends upon efficient management, there was a consolidation in 1965 of the technical assistance functions in the Secretariat (excluding some financial accounting functions and common services) into a Department of Technical Assistance. This organizational pattern of centralized management of all technical assistance is now to be found in all agencies operating technical assistance programmes and is in accordance with Resolution 2975 (XXVII) of the General Assembly of the United Nations, stemming from implementation problems experienced in connection with UNDP. An overriding advantage of this organizational structure is that it enables all aspects of direct aid to Member States to be put into sharp focus. This process is aided by the technical advice from Headquarters staff in the scientific Divisions to the Department of Technical Assistance on current and proposed programmes or projects, which takes account of ancillary assistance from the Agency and other sources, such as co-ordinated research programmes on specific problems affecting developing Member States and regional co-operation agreements for the exchange of scientists and information.

92. Finally, the fourth stage in the evaluation process is the assessment of results, aimed at determining the extent to which the assistance provided by the Agency to a project has made or is likely to make an impact on economic and social development. The making of such an assessment is basically a Government obligation, and, in the case of development programmes assisted in part by projects involving the application of nuclear techniques, the assessment would have to take account of many factors in addition to the effect of the contribution made by the Agency. All aid-giving agencies and recipient Governments recognize that the results of the contribution made by small-scale injections of technical assistance and by assistance which is not of the pre-investment type, when compared with the possible results of capital aid, are seldom quantifiable. Likewise, it is recognized that much assistance which is provided, for example, for the creation of scientific infrastructure, whilst it may not yield a quantifiable result, does give an indication of the extent of the development of physical and human resources. On the other hand, it would be premature for a Government to try and assess the specific results of the introduction of a new technique, or the creation, for example, of an agricultural research institute, immediately following or shortly after the phasing-out of multilateral aid.

93. In the carrying out of these parts of the process which are built into the rules governing the provision of technical assistance under UNDP and the regular programme, the Agency's evaluation effort is commensurate with the needs expressed by Governments. As mentioned above, the extent of Agency participation in evaluations carried out under the auspices of the United Nations system is likely to be marginal; however, the Agency always participates actively in such evaluations when the use of nuclear techniques has a major role to play in the economic development of a recipient country. The Agency therefore ensures that its evaluation effort remains modest in extent, that is, that it does not grow out of proportion to the amount of technical assistance provided and is in accordance with the wishes of Governments.

94. The technical assistance provided by the Agency is designed to fill a gap which the requesting country cannot fill from its own resources and is designed to promote economic and scientific development. Since its effect on the recipient country's development is likely to be fractional, it cannot be measured in isolation from the aims and objectives of the project of which it forms only a part. The project being assisted is, in turn, likely to be part of an intersectoral programme within a national development plan. Since Agency aid relates to the transfer or application of techniques, its impact will be greater if appropriate measures are taken to share and integrate the resulting benefits with activities in other sectors of the recipient country's economy.

95. An assessment of the sum of Agency aid provided to a series of small projects reveals the necessity for close co-operation at the national level between the scientific community, governmental technical services and the Ministry responsible for development. This is often lacking, and there are several countries in which the atomic energy authority, for example, does not integrate its activities with the electrical power concerns, or in which research reactor utilization programmes are not co-ordinated with the education authorities or with those responsible for agricultural or industrial production. In giving advice on the planning and implementation of an atomic energy development programme, Agency experts have strongly recommended that Governments, when establishing an atomic energy authority or commission, should ensure at least ex officio membership to all interested Ministries, including representation from the Ministry of Labour and Public Works in matters relating to industrial development, and from the Ministry of Health in connection with the promulgation of safety regulations governing the use of ionizing radiation, etc. These recommendations have usually been accepted, but experience has shown that it would have been advantageous in a few cases if the authority or commission had been made responsible to a specific Ministry rather than loosely attached to the office of the President or the Prime Minister.

2. Countries' ability to absorb Agency assistance

96. For several years, in assessing the impact made by Agency-provided experts and equipment on the development of projects being assisted and the effect of the project on the Government's economic and scientific development, the Secretariat has taken account of the views of recipient Governments and others concerned with the Agency's technical assistance programme. Those views, in so far as they relate to the assistance provided in recent years, are taken into account in paragraphs 97-106 below.

97. The crucial element involved in the transfer of skills is the expert, who may be required to install and demonstrate the use of items of equipment being provided in association with his assignment; this type of assistance may also be supplemented by the training abroad of counterpart staff prior to or following the expert's assignment. For the expert to achieve his objective it is essential that adequate counterpart facilities (personnel, laboratories, supporting workshops, etc.) be provided by the recipient Government. However, as assistance of this sort is usually only a small part of a project or a large programme, there are many factors to be considered by the Government if Agency assistance is to be effective.

98. Agencies providing aid have had to emphasize the necessity that recipient Governments fulfil their obligation to provide appropriate facilities as part of the technical co-operation framework required to ensure the effectiveness of the outside assistance. Over the years the Agency has noted that the situation in respect of Governments making an adequate number of counterpart personnel available has improved. However, several Governments have recently reported that some of the assistance provided by the Agency had not been effective because the national counterparts of the Agency's experts had not been of the requisite calibre or had left the project during the course of the assignment of the expert to take up other employment. Salary scales are often too low, on occasion compelling counterparts to hold two jobs. The attraction of higher paid employment in the private sector and of representational, more prestigious posts in the Government service have also been noted as causes of this situation.

99. On occasion, Governments have overestimated their own absorptive capacity. For example, in one country the Government decided to add a radioisotope laboratory to the facilities of the national university for use by all interested faculties. About two years after the establishment of the laboratory and introductory courses, the Government was still unable to find suitable numbers of counterpart post-graduates and the requisite technicians to staff the laboratory and assume responsibility for its operation when the expert left; therefore, in agreement with the Government and UNDP, assistance to the project was discontinued. It is hoped, however, to transfer the facility to a neighbouring country, which has reached a more advanced stage of scientific development, and make it available there to nationals from the original recipient country.

100. An endeavour has been made to ascertain the extent of the use made of equipment, which has been provided by the Agency, after the assistance to projects has been completed. It has been found that equipment items are usually well utilized and that care is taken to ensure that the supply of most items is not duplicated within the same institute, or even within the country in those cases where sophisticated and costly items have been provided. Recipient Governments continue to complain of an inadequate supply of accessories and spare parts, however, and are also concerned about meeting the cost for the proper servicing and maintenance of the equipment provided. In this connection the Agency stresses, at the time of the formulation of assistance involving the provision of equipment, the importance of the Government ensuring the availability of servicing facilities, and draws their attention to the necessity of making budgetary provision for foreign exchange to cover the cost of procuring necessary spare parts.

101. In order to help to solve the problem experienced by the developing countries in keeping complex items of equipment in good operating order, the Agency has conducted UNDP-financed training courses on the repair and maintenance of nuclear and electronic equipment at the ILO Turin Centre in 1968 and annually since 1970. It has also instituted courses in Ghana for the training of laboratory technicians and intends to hold similar courses in other regions in future to meet the needs of countries for specialized training of this kind.

102. Most of the programme and project support provided by the Agency is for economic and scientific development, in respect of which it is desirable that Governments establish meaningful immediate and long-term objectives, bearing in mind the fractional nature of Agency assistance. Government authorities are frequently asked to assess the utility of experts' recommendations in planning future activities and whether the assistance provided by the Agency has bridged the gap it was designed to fill. The general assessment in most recipient countries shows that the experts' recommendations have been helpful, that the Agency's assistance does provide the necessary technical expertise and, in the majority of cases, that national personnel can carry on the project after the expert leaves.

103. A feature of the assistance which is commented on favourably by many Governments is the frequent provision made by the Agency, in collaboration with the Government, for short-term return visits of experts over a period of years. Governments consider this practice to be most helpful in keeping programmes of scientific research under critical review and in providing guidance and advice at periodic intervals for the development of these programmes, as well as for the planning of associated activities. For example, an expert on a short-term assignment advised the governmental authorities in one country to introduce tracer technology in environmental pollution studies. This is to be followed up by another short-term visit of the expert, and, after assessing the progress made, it is foreseen that he will advise on the further experiments which should be instituted and on what adjustments should be made in the current programme. Similarly, in another country, the training of personnel in the use of thermoluminescence dosimetry techniques has been most successful, and these are being applied in some hospitals. The expert will return to ensure that these techniques are being applied in the most effective manner.

104. In the case of another project, whose objective is the production of irradiation-attenuated vaccine, the Agency's expert laid the foundations for the requisite research during a long-term assignment. He will be returning to the project as consultant in a series of short-term visits to assess and orient, where required, the programme which is being carried out by his national counterparts who received in-service training during his initial assignment. Assistance has been given in various subjects in recent years to another country for the development of its nuclear power programme. Now that the final decision has been taken by the Government to introduce nuclear power, it is seeking consultants to advise on long-range planning and nuclear safety supervision, and considers a series of short-term visits by Agency-appointed specialists to be the preferred solution of their local manpower problem.

105. On the other hand, experience has shown that for many programmes involving in-service training and in certain fields of activity, particularly agriculture in tropical environments, the assignment of Agency experts for long periods is highly desirable, especially where seasonal fluctuations can affect the progress of a programme. For example, fertilizer-uptake studies involving different crops usually fully occupy an expert and his counterparts. After planting and applying the fertilizer the expert must assist in the analysis of samples from previous experiments and plan the next experiments. In one country this is a two-year task involving crop rotation.

106. It is also of interest to note the catalytic effect of the presence of an international expert over a period of up to three years in a newly established institute. On occasion the presence of the Agency's expert has prevented the resignation of staff and ensured that a new programme with new equipment, in a new field of endeavour, has had a solid basis on which the Government could build when assistance to the project ceased. Long-term assistance has been provided by the Agency, at the request of Governments, not only to projects involving agricultural research, but also in respect of other activities such as the production of irradiation-attenuated vaccines, the introduction of new technological techniques in industrial processing and materials testing, and radioisotope production in research reactors. This demonstrates the need for flexibility in establishing the duration of expert assignments.

3. Survey of the impact of training

107. Last year's report contained the preliminary findings of a survey to assess the effectiveness of the Agency's fellowship programme [14]. Three measures of effectiveness used in the survey were:

- (a) Whether the fellow's training was directly related to his subsequent professional activities in his home country;
- (b) Whether his subsequent professional activities in his home country were part of a national atomic energy programme; and
- (c) Whether the fellow's subsequent professional activities were directly related to the development of his home country.

The survey was conducted by tabulating the data from a questionnaire sent to 1088 Agency fellows who had completed their training during the years 1959 through 1963 and, thus, had had ten or more years of professional service in their home countries since completing their fellowships. Replies to the questionnaire have now been received from a total of 397 fellows; their responses are summarized below to bring up to date the findings published in last year's report.

108. The relationship of Agency fellowship training to fellows' subsequent professional activities in the home country is as follows:

[14] GC(XVII)/INF/142, paras 93-96.

Relationship	Number of fellows	Percentage of total
Closely related	226	56.9
Closely related initially (later partially related)	43	10.8
Partially related	101	25.5
Unrelated	27	6.8
Total	397	100.0

109. The relationship of fellows' subsequent professional activities in the home country to national atomic energy programmes is as follows:

Relationship	Number of fellows	Percentage of total
Directly related	259	65.2
Indirectly related	95	23.2
Unrelated	43	11.6
Total	397	100.0

110. The relationship of fellows' subsequent professional activities to development efforts in the home country is as follows:

Relationship	Number of fellows	Percentage of total
Closely related	268	67.0
Partially related	115	28.6
Unrelated	14	4.4
Total	397	100.0

111. The frequency with which sectors in the home country have benefited from the training of former Agency fellows, as indicated in the 397 completed questionnaires, is shown below. Most fellows indicated that their training had enabled them to make meaningful contributions to activities in two or more sectors.

Sector	Number of indications	Frequency (397 = 100%)
Scientific and technological research and development	326	82%
Nuclear energy development and utilization	245	60%
Education	209	52%
Health	79	20%
Industry	62	16%
Energy	50	12%
Agriculture	41	10%
Other	5	1%
	Total	1017

112. These data demonstrate a close correlation between the goals of the Agency's fellowship programme and the work being done by the fellows ten or more years after the completion of their fellowships.

113. Especially interesting are the fellows' comments regarding the training they received during their fellowships. These comments not only give guidance and include suggestions for the administration of the fellowship programme, but often mention the value of the individual fellowship, as shown in the following two examples:

- (a) "The training I received under my IAEA fellowship is very useful in furthering my own activities and career, and especially in assisting the Director General of our national atomic energy agency on policy planning and development for the utilization of radioisotopes and radiation in industry, medicine, agriculture and other fields."
- (b) "The fellowship was of immense value in enabling me to make direct personal contact with the people concerned with the design and operation of nuclear power plants; also to make physical contact with operating nuclear power plants. My ability to teach basic Nuclear Power at my university school of engineering and to lecture to outside bodies, as well as my ability to handle nuclear laboratory equipment, are accomplishments on which my fellowship training has had direct bearing."

Part III. CONCLUSIONS

114. The trends noted in last year's report [15] continued throughout 1973. Thus, whilst formerly the emphasis in the programme was on the utilization of research reactors in developing Member States for, inter alia, the production of isotopes and labelled compounds, the trend is now towards the introduction of nuclear power and the application of nuclear technology for industrial and economic development.

115. The manner in which the Agency's technical assistance programme can assist in the introduction of nuclear power will vary according to the stage of power development in, and the energy requirements of, individual developing countries. For example, the Agency's assistance involvement in one country was spread over several years and carried out in two phases. In another country it is starting at the construction stage, with emphasis being placed on safety matters. In yet another case the Agency has provided assistance to the electrical power authorities during the initial planning stages of the country's nuclear power programme. The assistance required is unlikely to follow a set pattern, and a pragmatic approach to meeting needs, based on a joint assessment of the situation by the Agency and the requesting Government, is therefore expected to yield the best results.

116. In response to requests from Member States, the nuclear power market survey is being continued in studies designed primarily to determine the requirements of developing countries other than those already surveyed, and, concurrently, surveys of manpower requirements for nuclear power programmes are being initiated in developed and developing countries. Since the whole process of the introduction of nuclear power requires at least 8-10 years before a nuclear plant becomes operational, it is essential that the necessary planning and personnel training programmes, which constitute the preparatory stage of the process, be started as early as possible.

117. The introduction of nuclear power requires close co-operation between the atomic energy authorities and the electrical power authorities at the national level in the developing countries. Assistance to promote such co-operation has been given by the Agency to participants representing these two authorities in successful regional and interregional seminars which dealt with the practicality of the introduction of nuclear power in the developing countries. It is expected that this type of assistance will continue and be expanded.

118. The future demand for uranium, estimated to be three to four times the existing demand by 1980, now warrants concentrated investigation of what were formerly considered to be economically "marginal" deposits of uranium ore, as well as devoting more attention and funds to the completion and the updating of the findings of overall mineral resource surveys. The facilities and funds made available to carry out uranium resource surveys are likely to grow rapidly with the development of atomic energy programmes and the expanded use of nuclear power in developed and developing countries in future. The technical assistance available from the Agency in this respect is usually financed from its own resources in the case of work done at the initial planning and investigatory stages, whereas assistance in respect of activities at the development (that is, pre-investment) stage is financed under UNDP.

[15] Ibid., paras 105-107.

119. For the application of nuclear technology to national development, it is essential to have a sufficiently large cadre of trained personnel available at all levels. Training is an integral part of the Agency's technical assistance programme and is organized to help the developing countries create the scientific infrastructure needed to make progress. Training in the use of nuclear techniques in agricultural, medical, industrial and technological programmes applied to local conditions is a valuable tool, at the senior staff level, in creating groups of research scientists to staff national institutes. These programmes require strong support at the intermediate staff level by superintendents with a good knowledge of the technical and engineering aspects of the utilization of nuclear techniques. The amount of training organized under governmental programmes and in co-operation with the private sector in developed countries is likely to increase in the near future. Provision for the supply and retention of sufficient numbers of specialized technicians must be made by the Governments of the developing countries, and emphasis is being increasingly placed on training programmes at the national level, supplemented by regional and interregional training courses where there is an insufficient number of participants to warrant group training at the national level.

120. In the developing countries the continued expansion of institutions of higher learning requires the inclusion of nuclear science subjects in their curricula, and the creation of new technical institutes often calls for staff which is qualified in various branches of nuclear science as well as in the application of nuclear techniques. Whereas it was previously necessary to study nuclear science abroad, the teaching of numerous aspects of it at the national level is on the increase. The reports of the nuclear science teaching panels held jointly with UNESCO and consultants from developing and developed Member States in 1968, 1970 and 1973 stress the need for planning and advancing the development of science teaching in the developing world. With the introduction of the teaching of science into national curricula and the creation of appropriate research and teaching laboratories, the necessary facilities will have been established to enable graduates to continue their studies or to complete their training in their own countries and go on to become science teachers at the secondary and higher levels.

121. The overall financial situation of the Agency's technical assistance programme was, in common with all multilateral aid programmes, subject to the vagaries of the world-wide financial instability in 1973. Any increase in monetary and in kind resources was largely offset by inflation. It is therefore necessary to make the optimum use of the scarce cash resources provided for the implementation of the regular programme and the resources made available in kind, as well as the local counterpart personnel and facilities put at the disposal of projects by the recipient Governments. These facilities are often supported through capital aid and technical assistance provided under bilateral arrangements or through private investment. To ensure that there is no duplication in the provision of assistance, integrated programming by the recipient Government and the multilateral aid organization is essential. In the case of the Agency, procedures have been established in co-operation with recipient Governments in recent years to ensure that programme planning is integrated at the national level and that there is no duplication, for example, of assistance provided by the Agency and UNDP.

122. Bearing in mind that the Agency's work is concerned with a large number of diverse subjects, involving the use of new techniques that can make a significant contribution towards economic and scientific development, whereas the activities of the other organizations participating in UNDP are more homogeneous in character, there is a relatively greater need for the provision of assistance from the Agency in initiating programmes and projects than from most of the other organizations in the United Nations system. As a matter of fact, some of the assistance provided under the Agency's regular programme would not be appropriate for UNDP financing: for example, making available the services of atomic energy planners, helping with the preparation of pilot projects, meeting the cost of advisory services, siting and safety missions and arranging the

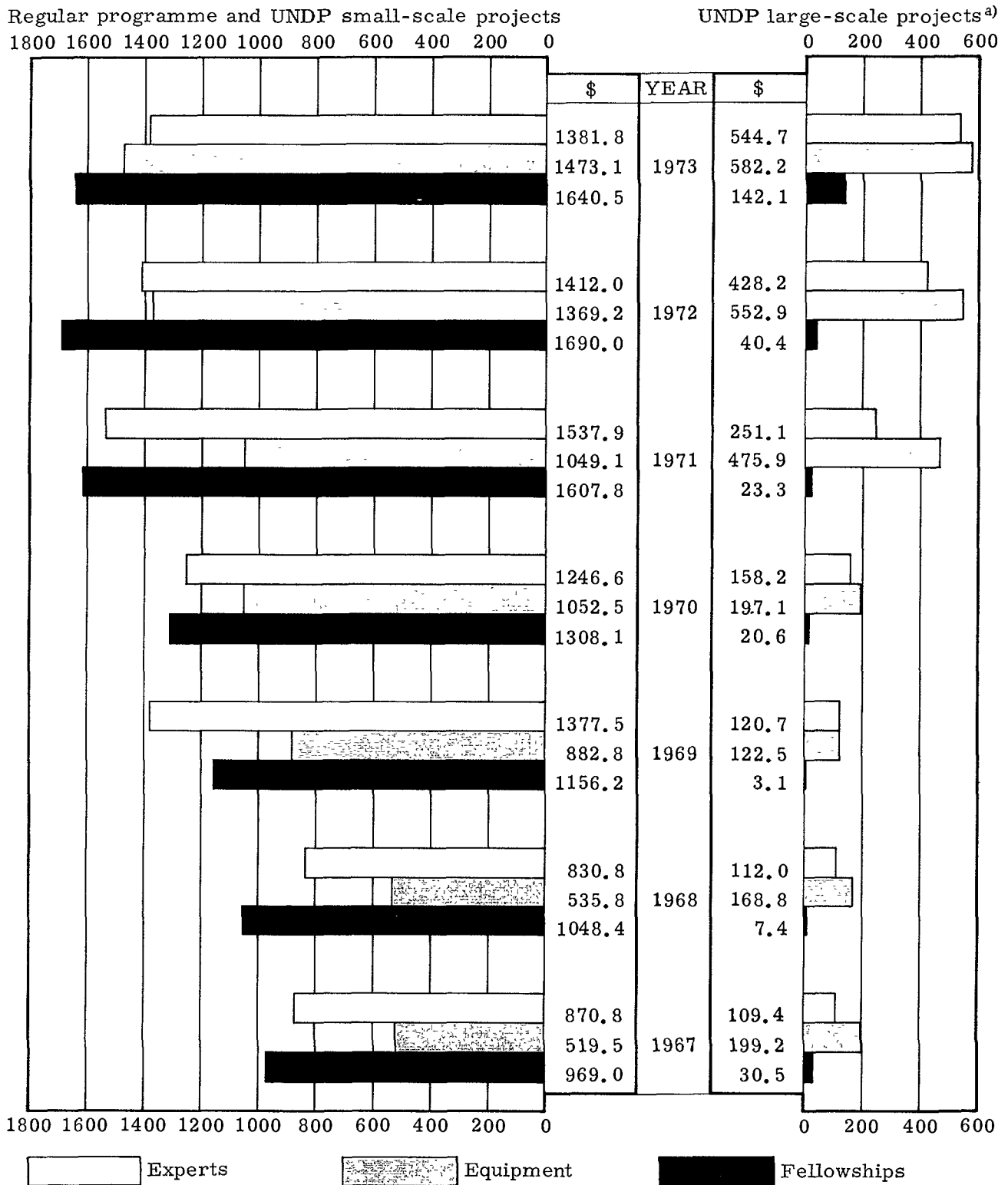
short-term visits of highly qualified consultants on advanced technological processes. However, once the foundation has been laid for full-scale development, UNDP financing of the pre-investment type usually becomes available for the required longer-term periods over which external assistance is needed.

123. The increasing number of projects now receiving large-scale UNDP assistance through the Agency are, almost without exception, projects which in the past were directly or indirectly assisted from the Agency's own resources and most likely could not have been started or continued without such help. Thus, it is essential that the Agency should continue to have a reliable source of funds for the provision of technical assistance, in addition to the funds made available by UNDP, to facilitate the introduction of nuclear techniques and ensure that the developing countries can obtain advice during the initial stages of the use of such techniques.

124. From the time when the Agency began to operate its technical assistance programme 15 years ago, that is, from the initial stages when preliminary assistance missions were dispatched to assess the need for Agency assistance, to the present, the programme has progressed to the stage of involvement in economic and scientific development in over 70 countries. In keeping with the fundamental principles governing the provision of multi-lateral aid, the assistance given has been provided in the form and manner requested by the recipient Governments, and the Agency's aid programme has evolved in conformity with criteria agreed to by donors and recipients. Furthermore, flexibility in planning and implementation has been introduced into the programme to adapt it to the circumstances prevailing in the developing countries. Whilst the assistance provided by the Agency represents only a fraction of the total development effort at the national level, it is increasingly being seen that it performs the essential task of providing objective advice and support for projects and the value of this contribution exceeds the actual financial cost to the Agency. The assistance available from and through the Agency has become a recognized part of the atomic energy development programme in most developing countries, and the foundation that has been laid should enable the Agency to respond more adequately in future to the situation resulting from the current energy supply problem and the increasing need for electrical power in the developing world.

FIGURE 7A

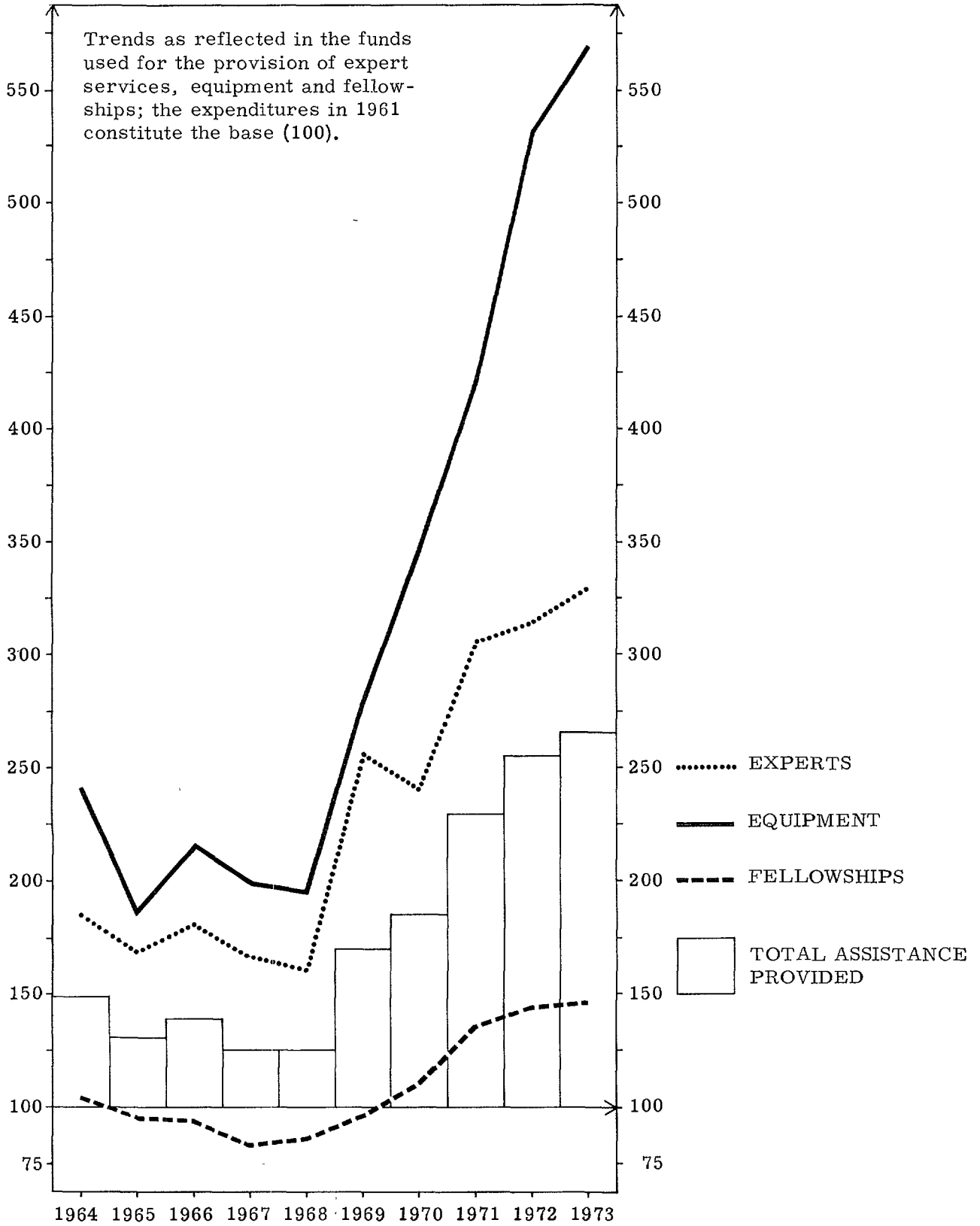
TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY
(in thousands of dollars)



^{a)}The UNDP large-scale project figures given above in respect of experts and equipment include expenditures on subcontracts and miscellaneous project costs; these amounted to \$129 300 in 1967, \$76 200 in 1968, \$70 500 in 1969, \$1100 in 1970, \$35 100 in 1971, \$203 800 in 1972 and \$196 800 in 1973.

FIGURE 7B

TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY



Note: Fellowships include participants in short-term training projects.

ANNEX I

STATISTICAL TABLES

Introductory Notes

Resources

1. Fig. 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 up-dated to 31 December 1973; 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 columns (1b) and (2b) of Table 1.

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

- (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;
- (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 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, 7 and 8 relate, in the first instance, to actual cash payments against 1973 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 1973 - is not included in the financial data relating to the assistance provided, but is shown separately in column 9 (see, for example, the 1973 entries in Table 4); the total cumulative balance of funds obligated in 1973 and prior years, but not yet spent as at 31 December 1973, 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 "Inter-country programmes" the assignments of a number of experts are not sub-divided 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 inter-country 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 country, Agency Type I and Type II awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1973 (all notifications of non-acceptances 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 one-year fellowships. Although awards for short-term training projects and scientific visits are included in Table 6 under "UNDP" and "Agency Type I" (in Table 5 under "Number of fellowships") and are financed under "in kind" and "multi-bilateral" arrangements, the regular programme or UNDP, they are not in the same category as Type I, Type II 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 "Inter-country programmes". None of the tables includes any reference to local participants in short-term training projects (see Annex III).

Inter-country 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 inter-regional projects for which experts, equipment and fellowships were provided (for example, short-term training courses), and regional and inter-regional 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 isotope hydrological services provided by the Agency under subcontracts to other organizations executing UNDP projects (see Annex IV), or in respect of projects carried out under funds-in-trust arrangements.

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: 1964-1973
(in thousands of dollars)

Year	Agency		UNDP		Sub-totals		TOTAL (3) + (4) (5)
	Monetary (1a)	In kind ^{a/} (1b)	Monetary (2a)	In kind ^{a/} (2b)	Agency (3)	UNDP (4)	
1964	1 115	600	1 240	3	1 715	1 243	2 958
1965	1 200	488	1 317	9	1 688	1 326	3 014
1966	1 263	526	1 462	2	1 789	1 464	3 253
1967	1 380	565	1 431	5	1 945	1 436	3 381
1968	1 348	560	1 422	5	1 908	1 427	3 335
1969	1 587	654	981	4	2 241	985	3 226
1970	1 749	915	1 513	17	2 664	1 530	4 194
1971	2 214	1 368	1 775	42	3 582	1 817	5 399
1972	2 642	961	2 577	6	3 603	2 583	6 186
1973	3 114	1 241	3 149	35	4 355	3 184	7 539
1964- 1973	17 612	7 878	16 867	128	25 490	16 995	42 485

^{a/} Estimated; see Introductory Notes, paras 1 and 2, to this Annex.

Table 2

Funds for the Agency's regular programme of technical assistance: 1964-1973
(in thousands of dollars)

Item	1964-1969	1970	1971	1972	1973	1964-1973
Target for voluntary contributions to the General Fund ^{a/}	12 000	2 000	2 500	3 000	3 000	22 500
Share of target budgeted for technical assistance	10 464	1 877	2 437	3 000	3 000	20 778
Amount pledged	8 389	1 673	2 143	2 482	2 836	17 523
Actually made available for technical assistance ^{b/}	7 893	1 749	2 214	2 642	3 114	17 612

^{a/} 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.

^{b/} 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 in each of the years 1970-1973 exceeds the amount pledged.

Table 3

Experts (classified by place of origin) and fellowship awards (classified by place of study): 1973

Place of origin of experts or place of study for holders of fellowship awards	Experts					Fellowship awards						TOTAL
	UNDP		Agency		TOTAL	UNDP		Agency			TOTAL	
	Paid	Free	Paid	Free		Country	Regional	Type I	Type II	Regional		
Argentina	2 ^{a/}	-	2	-	4	3 ^{b/}	-	1	4	-	-	8
Australia	1	-	-	-	1	-	-	2	-	-	-	2
Austria	1	-	-	-	1	3 ^{b/}	-	3	2	-	7	15
Bangladesh	1	-	1	-	2	-	-	-	-	-	-	-
Belgium	2	-	2	-	4	4 ^{b/}	-	4	6 ^{c/}	-	4	18
Brazil	1	-	1	-	2	-	-	-	1 ^{c/}	-	-	1
Canada	5 ^{a/}	-	3	-	8	8 ^{b/}	-	2	1 ^{c/}	-	4	15
Chile	-	-	1	-	1	-	-	-	-	-	-	-
CSSR	2	-	5	-	7	3 ^{b/}	-	-	-	25	2	30
Denmark	3 ^{a/}	-	3	-	6	5 ^{b/}	-	-	4	-	5	14
Egypt, A. R.	1	-	4	-	5	-	-	1	1	-	-	2
Finland	-	-	1	-	1	2	-	-	1	-	-	3
France	10 ^{a/}	-	8	-	18	10 ^{b/}	-	11	10	-	11	42
Germany, F. R.	13 ^{a/}	-	7	-	20	16 ^{b/}	-	8	24	8	12	68
Greece	-	-	1	-	1	-	14	3	-	-	-	17
Hungary	2 ^{a/}	-	2	-	4	1 ^{b/}	-	-	3	-	-	4
India	2	-	2	-	4	4 ^{b/}	22	-	2	-	2	30
Iran	1	-	-	-	1	-	-	-	-	-	-	-
Israel	1	-	1	-	2	1 ^{b/}	-	-	1	-	1	3
Italy	3	-	3	-	6	3 ^{b/}	13	2	17	-	9	44
Japan	1	-	3	-	4	9 ^{b/}	-	-	10	-	1	20
Korea, R.	-	-	-	-	-	-	-	-	-	-	1	1
Kuwait	-	-	-	-	-	-	-	-	-	-	1	1
Mexico	1 ^{a/}	-	-	-	1	3 ^{b/}	13	-	1	-	-	14
Netherlands	1	-	2	-	3	3 ^{b/}	-	1	6	-	4	14
New Zealand	1 ^{a/}	-	-	-	1	-	-	-	-	-	-	-
Norway	1 ^{a/}	-	1	-	2	-	-	1	-	-	-	1
Pakistan	1 ^{a/}	-	-	-	1	-	-	-	-	-	-	-
Peru	-	-	-	-	-	2	-	-	-	-	-	2
Philippines	1	-	1	-	2	-	-	-	-	-	-	-
Poland	2	-	3	-	5	2 ^{b/}	-	1	6	25	-	34
Romania	1	-	2	-	3	-	-	-	1	-	-	1
Spain	1	-	2	-	3	-	-	-	5	-	2	7
Sweden	8 ^{a/}	-	4	10	22	6 ^{b/}	-	2	-	-	7	15
Switzerland	-	-	1	-	1	-	-	1	-	-	-	1
Thailand	-	-	-	-	-	-	28	-	-	-	-	28
USSR	-	-	1	-	1	-	-	-	6	53	-	59
UK	11 ^{a/}	-	18	-	29	8 ^{b/}	-	32	2 ^{c/}	-	11	53
USA	14 ^{a/}	3	19	1	37	19 ^{b/}	-	22	48 ^{c/}	37	14	140
Viet-Nam	1	-	-	-	1	-	-	-	-	-	-	-
Yugoslavia	5 ^{a/}	-	6	-	11	-	-	-	2	15	2	19
IAEA, Austria	15 ^{a/}	-	16	-	31	2 ^{b/}	-	4	-	-	5	11
Sub-total	116	3	126	11	256	114	90	101	164	163	105	737
CERN, Switzerland	-	-	-	-	-	-	-	1	-	-	1	2
Nuclear Materials Technology Course, Buenos Aires	-	-	-	-	-	-	-	1	-	-	-	1
Pan-American Training Course on Metallurgy, Buenos Aires	-	-	-	-	-	-	-	2	-	-	-	2
Sub-total	-	-	-	-	-	-	-	4	-	-	1	5
GRAND TOTAL	116	3	126	11	256	114	90	105	164	163	106	742 ^{d/}

a/ Includes the following large-scale project experts, from: Argentina, one; Canada, three; Denmark, two; France, five; Germany, F. R., three; Hungary, one; Israel, one; Mexico, one; New Zealand, one; Norway, one; Pakistan, one; Sweden, four; United Kingdom, six; United States, five; Yugoslavia, one; IAEA staff, one.

b/ Includes the following large-scale project awards, in: Argentina, three; Austria, three; Belgium, two; Canada, eight; CSSR, three; Denmark, five; France, seven; Germany, F. R., ten; Hungary, one; India, four; Israel, one; Italy, two; Japan, seven; Netherlands, three; Poland, two; Sweden, five; United Kingdom, six; United States, ten; IAEA, Austria, one.

c/ Includes the following SIDA-financed awards, in: Belgium, one; Canada, one; United Kingdom, two; United States, three.

d/ The difference between the number of awards (574) and the number of places of study (742) is due to the fact that nine fellows studied in two, five in three, one in four, three in five and three in seven different countries; 25 participants in a study tour went to three countries; 40 participants in the scientific visit programme went to 106 places of study.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1964-1973
(in thousands of dollars)

TYPE	Experts		Visiting professors		Equipment		Fellowships		Scientific visits		Intercountry projects		Subcontracts		TOTAL		Assistance outstanding at 31 December 1973		TOTAL
																	Unliquidated obligations	In kind balance ^{a/}	(8) + (9) + (10)
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	(10)	(11)
	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	\$	\$
1964-1969																			
UNDP monetary	2 987.1	39.0	-	-	1 994.2	26.0	862.1	11.2	-	-	1 221.7	15.9	605.2	7.9	7 670.3	100.0	-	-	7 670.3
Agency monetary	2 360.1	33.6	549.6	7.8	1 512.9	21.5	1 949.2	27.8	119.6	1.7	530.6	7.6	-	-	7 022.0	100.0	3.1	-	7 025.1
Assistance in kind ^{a/}	56.1	1.6	-	-	363.3	10.7	2 930.4	86.5	-	-	39.2	1.2	-	-	3 389.0	100.0	-	-	3 389.0
TOTAL	5 403.3	29.9	549.6	3.0	3 870.4	21.4	5 741.7	31.8	119.6	0.7	1 791.5	9.9	605.2	3.3	18 081.3	100.0	3.1	-	18 084.4
1970																			
UNDP monetary	608.2	41.4	-	-	517.7	35.2	120.0	8.2	-	-	243.6	16.6	(20.3)	(1.4)	1 469.2	100.0	-	-	1 469.2
Agency monetary	571.3	35.3	75.9	4.7	409.8	25.3	401.6	24.8	18.9	1.2	141.8	8.7	-	-	1 619.3	100.0	27.5	-	1 646.8
Assistance in kind ^{a/}	18.3	2.1	-	-	300.8	33.6	512.7	57.3	-	-	62.8	7.0	-	-	894.6	100.0	-	0.7	895.3
TOTAL	1 197.8	30.1	75.9	1.9	1 228.3	30.8	1 034.3	26.0	18.9	0.5	448.2	11.2	(20.3)	(0.5)	3 983.1	100.0	27.5	0.7	4 011.3
1971																			
UNDP monetary	746.7	40.6	-	-	666.0	36.2	127.7	6.9	-	-	275.1	15.0	23.3	1.3	1 838.8	100.0	-	-	1 838.8
Agency monetary	760.1	35.8	60.7	2.9	495.1	23.3	509.3	24.0	26.7	1.2	272.7	12.8	-	-	2 124.6	100.0	102.7	-	2 227.3
Assistance in kind ^{a/}	27.0	2.7	-	-	240.4	24.5	630.8	64.3	-	-	83.5	8.5	-	-	981.7	100.0	-	19.2	1 000.9
TOTAL	1 533.8	31.0	60.7	1.2	1 401.5	28.4	1 267.8	25.6	26.7	0.5	631.3	12.8	23.3	0.5	4 945.1	100.0	102.7	19.2	5 067.0
1972																			
UNDP monetary	818.3	39.5	-	-	768.2	37.1	162.8	7.9	-	-	127.5	6.1	195.2	9.4	2 072.0	100.0	-	-	2 072.0
Agency monetary	822.2	32.2	49.6	1.9	801.4	31.4	594.6	23.3	28.9	1.1	259.3	10.1	-	-	2 556.0	100.0	445.3	-	3 001.3
Assistance in kind ^{a/}	8.1	0.9	-	-	92.0	10.6	681.1	78.8	-	-	83.5	9.7	-	-	864.7	100.0	-	208.6	1 073.3
TOTAL	1 648.6	30.0	49.6	0.9	1 661.6	30.2	1 438.5	26.2	28.9	0.5	470.3	8.6	195.2	3.6	5 492.7	100.0	445.3	208.6	6 146.6
1973																			
UNDP monetary	921.4 ^{b/}	46.9	-	-	501.5	25.5	257.7	13.1	-	-	103.3	5.3	180.4	9.2	1 964.3	100.0	928.2	-	2 892.5
Agency monetary	881.6 ^{b/}	32.9	21.0	0.8	998.1 ^{c/}	37.3	453.3 ^{d/}	16.9	82.2	3.1	239.7	9.0	-	-	2 675.9	100.0	1 105.3	-	3 781.2
Assistance in kind ^{a/}	25.6	2.3	-	-	351.2	31.2	640.4	57.0	-	-	107.0	9.5	-	-	1 124.2	100.0	-	633.8	1 758.0
TOTAL	1 828.6	31.7	21.0	0.4	1 850.8	32.1	1 351.4	23.5	82.2	1.4	450.0	7.8	180.4	3.1	5 764.4	100.0	2 033.5	633.8	8 431.7
1964-1973																			
UNDP monetary	6 081.7	40.5	-	-	4 447.6	29.6	1 530.3	10.2	-	-	1 971.2	13.1	983.8	6.6	15 014.6	100.0	928.2	-	15 942.8
Agency monetary	5 395.3	33.7	756.8	4.8	4 217.3	26.4	3 908.0	24.4	276.3	1.7	1 444.1	9.0	-	-	15 997.8	100.0	1 683.9	-	17 681.7
Assistance in kind ^{a/}	135.1	1.8	-	-	1 347.7	18.6	5 395.4	74.4	-	-	376.0	5.2	-	-	7 254.2	100.0	-	862.3	8 116.5
GRAND TOTAL	11 612.1	30.3	756.8	2.0	10 012.6	26.2	10 833.7	28.3	276.3	0.7	3 791.3	9.9	983.8	2.6	38 266.6	100.0	2 612.1	862.3	41 741.0

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

b/ The 1973 figures for "Experts" include miscellaneous and bank charges amounting to \$17 500 under "UNDP monetary" and \$6000 under "Agency monetary".

c/ The 1973 figures for "Equipment" include miscellaneous charges amounting to \$5700 under "Agency monetary".

d/ The 1973 figures for "Fellowships" include insurance costs amounting to \$300 under "Agency monetary".

Table 5

Fields of technical assistance: 1973

Field of activity	Number of expert assignments	Cost of equipment (in thousands of dollars)	Number of fellowship awards ^{a/}
General atomic energy development	26	31.2	38
Nuclear physics	22	152.0	85
Nuclear chemistry	15	122.0	22
Prospecting, mining and processing of nuclear materials	20	129.6	17
Nuclear engineering and technology	38	350.0	97
Application of isotopes and radiation in agriculture	65	508.0	123
Application of isotopes and radiation in medicine	17	217.4	36
Application of isotopes and radiation in biology	8	1.5	14
Other fields of application of isotopes and radiation	29	448.7	69
Safety in nuclear energy	28	94.9	73
TOTAL	268	2055.3	574

^{a/} These figures include 203 participants in 11 regional and interregional training projects and 40 holders of awards for scientific visits.

Table 6

Recipients of expert services and fellowship awards: 1973

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
	Paid		Free		Paid		Free			Type I		Type II		Type I		Type II		
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)		
<u>Country programmes:</u>																		
Afghanistan	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	1	6	
Albania	-	-	-	-	-	-	-	-	-	-	-	2	14	-	-	2	14	
Algeria	-	-	-	-	-	-	-	-	-	-	-	2	24	-	-	2	24	
Argentina	6 ^{a/}	26	-	-	7	17	-	-	13	43	4 ^{b/}	15	3	34	4	36	11	85
Bangladesh	-	-	-	-	-	-	-	-	-	-	-	2	20	5	57	7	77	
Bolivia	-	-	-	-	2	3	-	-	2	3	-	-	2	14	2	24	4	38
Brazil	15 ^{a/}	45	-	-	5	17	-	-	20	62	8 ^{b/}	119	3	36	1	10	12	165
Bulgaria	1	1	-	-	3	3	-	-	4	4	3	13	4	34	6	48	13	95
Burma	1	3	-	-	4	22	-	-	5	25	-	-	-	-	-	-	-	-
Cameroon	2	18	-	-	2	6	-	-	4	24	-	-	1	6	3	20	4	26
Chile	1 ^{a/}	12	-	-	2	9	-	-	3	21	2	16	-	-	2	22	4	38
Colombia	-	-	-	-	1	1	-	-	1	1	-	-	-	-	3	36	3	36
Costa Rica	-	-	-	-	2	6	-	-	2	6	-	-	-	-	1	6	1	6
Cuba	-	-	-	-	3	12	-	-	3	12	-	-	-	-	1	12	1	12
Cyprus	2	1	-	-	2	12	-	-	4	13	-	-	2	24	1	6	3	30
CSSR	-	-	-	-	-	-	-	-	-	-	1 ^{b/}	1	2	18	9	84	12	103
Egypt, A. R.	1	2	-	-	1	1	-	-	2	3	4 ^{b/}	33	2	22	21	204	27	259
El Salvador	-	-	-	-	-	-	-	-	-	-	-	1	12	-	-	1	12	-
Ethiopia	1	10	-	-	-	-	-	-	1	10	-	-	-	-	-	-	-	-
Ghana	1	1	-	-	2	6	-	-	3	7	1	12	2	13	1	12	4	37
Greece	5 ^{a/}	43	-	-	4	7	-	-	9	50	3 ^{b/}	18	3	24	5	54	11	96
Guatemala	1	2	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	-	-	-	-	-	-	-	4 ^{c/}	45	8	72	12	117
India	12 ^{a/}	53	-	-	3	5	-	-	15	58	6 ^{b/}	50	6	48	10	103	22	201
Indonesia	1	2	-	-	2	7	-	-	3	9	1	6	2	24	2	15	5	45
Iran	1	1	-	-	4	10	-	-	5	11	-	-	1	12	6	55	7	67
Iraq	-	-	-	-	4	10	-	-	4	10	-	-	3	27	5	43	8	70
Israel	-	-	-	-	6	4	-	-	6	4	2	2	2	14	1	11	5	27
Ivory Coast	1	5	-	-	1	1	-	-	2	6	-	-	-	-	-	-	-	-
Jamaica	-	-	-	-	-	-	-	-	-	-	-	-	1	12	-	-	1	12
Jordan	1	2	-	-	-	-	-	-	1	2	-	-	1	9	1	12	2	21
Kenya	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	1	4	-
Korea, R.	1	2	-	-	3	10	-	-	4	12	7 ^{b/}	5	3	34	3	31	13	70
Lebanon	2	15	-	-	3	5	-	-	5	20	-	-	-	1	9	1	9	-
Liberia	1	12	1	10	-	-	-	-	2	22	-	-	-	-	-	-	-	-
Madagascar	-	-	-	-	-	-	-	-	-	-	-	-	2 ^{c/}	16	-	-	2	16
Malaysia	-	-	-	-	2	7	-	-	2	7	-	-	3 ^{c/}	39	2	18	5	57
Mal	-	-	-	-	1	5	-	-	1	5	-	-	-	-	-	-	-	-
Mexico	2	6	-	-	7	31	1	1	10	38	2	15	4	29	2	21	8	65
Morocco	2 ^{a/}	18	-	-	4	29	-	-	6	47	-	-	1	12	1	9	2	21
Nigeria	-	-	-	-	2	7	-	-	2	7	-	-	1	9	-	-	1	9
Pakistan	5 ^{a/}	31	-	-	1	12	-	-	6	43	2 ^{b/}	21	4	33	7	69	13	123
Peru	-	-	-	-	5	16	-	-	5	16	-	-	-	-	-	-	-	-
Philippines	-	-	-	-	3	6	-	-	3	6	-	-	2	22	9	85	11	107
Poland	-	-	-	-	1	2	-	-	1	2	-	-	4	40	8	76	12	116
Romania	7 ^{a/}	12	-	-	2	4	-	-	9	16	13 ^{b/}	55	3	28	6	64	22	147
Senegal	-	-	-	-	2	1	-	-	2	1	-	-	-	-	-	-	-	-
Sierra Leone	-	-	-	-	1	4	-	-	1	4	-	-	-	-	-	-	-	-
Singapore	-	-	-	-	1	2	-	-	1	2	-	-	1	6	2	13	3	19
Sri Lanka	-	-	-	-	3	13	-	-	3	13	-	-	-	-	2	14	2	14
Sudan	-	-	-	-	1	12	-	-	1	12	-	-	1	12	-	-	1	12
Syrian A. R.	1	1	-	-	2	17	-	-	3	18	-	-	2	16	2	24	4	40
Tanzania, U. R.	1	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Thailand	1	1	-	-	6	24	-	-	7	25	2	18	3	36	6	58	11	112
Turkey	2	2	-	-	3	10	-	-	5	12	2	18	3	30	5	56	10	104

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	
	Paid		Free		Paid		Free		(1)	(2)	(1)	(2)	Type I		Type II		(1)	(2)
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)					(1)	(2)	(1)	(2)		
Uganda	-	-	-	-	1	2	-	-	1	2	-	-	-	-	-	-	-	-
Uruguay	1	2	-	-	-	-	-	-	1	2	-	-	-	-	2	18	2	18
Venezuela	1	12	-	-	1	8	-	-	2	20	-	-	-	-	-	-	-	-
Viet-Nam	-	-	-	-	-	-	-	-	-	-	-	-	3	34	-	-	3	34
Yugoslavia	1	1	-	-	5	4	-	-	6	5	3	9	4	30	2	17	9	56
Zaire, R.	-	-	-	-	1	2	-	-	1	2	-	-	4	29	3	36	7	65
Zambia	1 ^{a/}	12	-	-	-	-	-	-	1	12	-	-	-	-	1	12	1	12
Sub-total	82	355	1	10	121	392	1	1	205	758	68	444	100	947	163	1 576	331	2 967

Inter-country programmes:

Short-term training projects	35	20	3	1	15	8	10	3	63	32	90	82	98	135	15	13	203	230
Scientific visits	-	-	-	-	-	-	-	-	-	-	-	-	40	55	-	-	40	55
Sub-total	35	20	3	1	15	8	10	3	63	32	90	82	138	190	15	13	243	285
GRAND TOTAL	117	375	4	11	136	400	11	4	268 ^{d/}	790	158	526	238	1 137	178	1 589	574	3 252

(1) Number (2) Number of man-months

a/ Includes the following large-scale project experts one/12 man-months, Argentina; six/20 man-months, Brazil, one/12 man-months, Chile; four/42 man-months, Greece; 12/53 man-months, India; five/31 man-months, Pakistan; seven/12 man-months, Romania; one/12 man-months, Zambia.

b/ Includes the following large-scale project awards: two/2 man-months, Argentina; six/95 man-months, Brazil; two/16 man-months, Chile; three/27 man-months, Egypt, A.R.; three/18 man-months, Greece; six/50 man-months, India; seven/5 man-months, Korea, R.; two/21 man-months, Pakistan; 12/53 man-months, Romania.

c/ One award was financed from two sources and is shown under "Type II".

d/ The difference between the number of assignments (268) and the actual number of experts (256) is due to the fact that each of nine experts served in two and one in four different countries.

Table 7

Financial summary: 1973
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1973		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP		Agency		TOTAL	Unliquidated obligations	In kind balance ^{a/}	
					Monetary	In kind ^{a/}	Monetary	In kind ^{a/}				
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)	
Country programmes:												
Afghanistan	-	-	1.8	1.8	-	-	1.8	-	1.8	1.4	-	3.2
Albania	-	14.7	1.8	16.5	-	-	16.5	-	16.5	3.6	3.5	23.6
Algeria	-	-	19.1	19.1	6.9	-	12.2	-	19.1	7.9	-	27.0
Argentina	77.7	46.5	44.4	168.6	39.5	-	107.4	21.7	168.6	86.0	27.7	282.3
Austria	-	-	4.5	4.5	-	-	4.5	-	4.5	-	-	4.5
Bangladesh	-	25.6	9.9	35.5	-	-	29.1	6.4	35.5	18.3	26.6	80.4
Bolivia	4.7	0.8	18.2	23.7	-	-	12.2	11.5	23.7	10.5	8.7	42.9
Brazil	101.2	14.5	45.8	161.5	79.4	-	65.5	16.6	161.5	48.8	8.5	218.8
Bulgaria	9.9	31.5	43.3	84.7	15.6	-	46.9	22.2	84.7	31.4	30.5	146.6
Burma	60.2	39.1	6.6	105.9	8.2	-	96.3	1.4	105.9	46.6	2.7	155.2
Cameroon	66.0	5.5	5.3	76.8	50.3	-	24.0	2.5	76.8	8.2	7.5	92.5
Chile	19.2	14.7	21.1	55.0	-	-	35.3	19.7	55.0	2.5	3.2	60.7
Colombia	5.5	47.3	7.8	60.6	-	-	18.9	41.7	60.6	18.4	14.2	93.2
Costa Rica	14.4	-	2.9	17.3	-	-	17.3	-	17.3	19.1	11.2	47.6
Cuba	30.1	39.3	4.7	74.1	-	-	55.0	19.1	74.1	105.5	20.6	200.2
Cyprus	24.5	32.6	6.0	63.1	0.6	-	50.0	12.5	63.1	16.1	4.1	83.3
CSSR	-	-	32.6	32.6	0.7	-	16.7	15.2	32.6	10.3	35.9	78.8
Ecuador	-	13.6	-	13.6	-	-	-	13.6	13.6	-	-	13.6
Egypt, A. R.	5.7	57.8	97.9	161.4	12.2	-	82.2	67.0	161.4	99.1	76.5	337.0
El Salvador	-	17.3	4.9	22.2	-	-	0.8	21.4	22.2	6.2	-	28.4
Ethiopia	22.9	-	-	22.9	22.9	-	-	-	22.9	2.4	-	25.3
Ghana	18.3	22.3	12.1	52.7	11.9	-	40.8	-	52.7	27.9	6.8	87.4
Greece	18.8	3.5	34.4	56.7	3.7	-	32.4	20.6	56.7	41.7	38.7	137.1
Guatemala	5.3	7.0	-	12.3	4.6	-	0.7	7.0	12.3	-	26.4	38.7
Hong Kong	-	30.5	-	30.5	-	-	30.5	-	30.5	16.8	-	47.3
Hungary	1.3	111.7	49.1	162.1	1.3	-	139.6	21.2	162.1	37.1	25.1	224.3
India	15.2	56.2	92.3	163.7	4.9	-	99.9	58.9	163.7	24.7	48.8	237.2
Indonesia	16.6	59.2	21.0	96.8	26.6	-	44.4	25.8	96.8	75.3	10.2	182.3
Iran	30.2	5.2	12.1	47.5	10.9	-	31.1	5.5	47.5	7.0	28.2	82.7
Iraq	29.8	4.4	34.3	68.5	4.2	-	44.5	19.8	68.5	146.1	24.9	239.5
Israel	13.3	26.0	21.3	60.6	6.4	-	41.7	12.5	60.6	20.8	15.5	96.9
Ivory Coast	14.2	-	-	14.2	13.9	-	0.3	-	14.2	0.2	-	14.4
Jamaica	1.1	-	1.4	2.5	-	-	2.5	-	2.5	4.2	-	6.7
Jordan	6.3	10.2	11.1	27.6	5.3	-	14.5	7.8	27.6	13.2	4.7	45.5
Kenya	-	18.6	2.6	21.2	-	-	-	21.2	21.2	-	-	21.2
Korea, R.	31.6	19.6	40.6	91.8	2.2	-	61.3	28.3	91.8	64.9	28.9	185.6
Lebanon	37.2	33.5	-	70.7	51.8	-	18.9	-	70.7	28.3	5.0	104.0
Liberia	44.3	11.3	-	55.6	26.5	17.8	0.1	11.2	55.6	3.3	14.4	73.3
Madagascar	-	-	5.2	5.2	-	-	5.2	-	5.2	2.0	-	7.2
Malaysia	18.9	22.9	17.1	58.9	-	-	35.5	23.4	58.9	21.2	4.7	84.8
Mali	13.9	0.2	-	14.1	-	-	14.1	-	14.1	14.9	-	29.0
Mexico	86.1	10.1	28.3	124.5	40.3	-	81.9	2.3	124.5	53.2	7.5	185.2
Morocco	88.5	22.4	9.9	120.8	29.1	-	88.7	3.0	120.8	65.6	3.4	189.8
Nigeria	16.1	23.9	13.4	53.4	-	-	53.4	-	53.4	20.5	-	73.9
Pakistan	18.7	28.2	67.0	113.9	-	-	74.3	39.6	113.9	73.9	52.0	239.8
Panama	-	5.2	7.0	12.2	-	-	5.2	7.0	12.2	-	-	12.2
Peru	35.7	100.5	12.6	148.8	2.0	-	35.2	111.6	148.8	4.9	25.0	178.7
Philippines	10.6	27.9	82.7	121.2	4.6	-	60.8	55.8	121.2	52.7	28.7	202.6
Poland	5.5	29.3	42.0	76.8	-	-	57.9	18.9	76.8	56.4	26.5	159.7
Romania	10.9	91.4	48.0	150.3	7.2	-	117.1	26.0	150.3	61.9	33.5	245.7
Senegal	2.4	2.0	-	4.4	-	-	4.4	-	4.4	0.2	-	4.6
Sierra Leone	9.9	7.2	5.0	22.1	-	-	17.1	5.0	22.1	0.7	-	22.8
Singapore	6.0	-	8.8	14.8	-	-	10.1	4.7	14.8	15.1	5.5	35.4
Sri Lanka	26.6	38.9	9.4	74.9	2.1	-	71.0	1.8	74.9	20.8	3.3	99.0
Sudan	26.0	16.4	7.2	49.6	-	-	49.6	-	49.6	11.2	-	60.8
Syrian A.R.	35.1	15.6	25.2	75.9	0.5	-	63.6	11.8	75.9	13.5	12.8	102.2
Tanzania, U. R.	2.2	-	-	2.2	2.2	-	-	-	2.2	0.9	-	3.1
Thailand	53.2	11.6	65.0	129.8	14.2	-	58.1	57.5	129.8	114.3	21.0	265.1
Tunisia	1.3	8.0	-	9.3	-	-	9.3	-	9.3	5.4	-	14.7
Turkey	22.0	28.4	38.2	88.6	17.8	-	41.2	29.6	88.6	23.5	34.1	146.2

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1973		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP		Agency		TOTAL	Unliquidated obligations	In kind balance ^{a/}	
					Monetary	In kind ^{a/}	Monetary	In kind ^{a/}				
					(1)	(2)	(3)	(4)				
Uganda	10.7	0.5	0.5	11.7	3.6	-	8.1	-	11.7	-	-	11.7
Uruguay	1.5	51.8	7.2	60.5	3.3	-	50.0	7.2	60.5	48.2	2.8	111.5
Venezuela	49.5	7.7	-	57.2	26.1	-	23.4	7.7	57.2	41.8	-	99.0
Viet-Nam	-	19.8	26.1	45.9	-	-	9.8	36.1	45.9	15.9	12.2	74.0
Yugoslavia	10.8	48.2	23.0	82.0	31.3	-	45.6	5.1	82.0	44.3	10.6	136.9
Zaire, R.	9.7	2.6	22.4	34.7	-	-	34.7	-	34.7	13.2	18.5	66.4
Zambia	0.5	2.6	9.1	12.2	-	-	3.1	9.1	12.2	1.5	1.2	14.9
Sub-total	1297.8	1443.3	1291.2	4032.3	594.8	17.8	2424.2	995.5	4032.3	1851.5	862.3	6746.1
<u>Intercountry programmes:</u>												
Asia and the Far East	25.3	0.6	25.1	51.0	40.1	7.8	3.1	-	51.0	23.7	-	74.7
Latin America	5.8	0.2	3.5	9.5	7.6	1.9	-	-	9.5	7.5	-	17.0
Interregional projects	45.8	23.3	320.4	389.5	55.6	3.6	236.6	93.7	389.5	131.9	-	521.4
Sub-total	76.9	24.1	349.0	450.0	103.3	13.3	239.7	93.7	450.0	163.1	-	613.1
Miscellaneous	7.1	5.7	0.3	13.1	1.1	-	12.0	-	13.1	-	-	13.1
<u>UNDP large-scale projects</u>												
Argentina	38.9	4.6	4.0	47.5	47.5	-	-	-	47.5	6.4	-	53.9
Brazil	64.2	100.5	32.4	197.1	193.4	3.7	-	-	197.1	75.0	-	272.1
Chile	23.9	-	6.1	30.0	30.0	-	-	-	30.0	12.3	-	42.3
Egypt, A. R.	-	9.4	7.3	16.7	16.7	-	-	-	16.7	30.4	-	47.1
Greece	107.6	5.3	9.1	122.0	122.0	-	-	-	122.0	19.8	-	141.8
India	154.8	319.7	37.6	512.1	512.1	-	-	-	512.1	175.0	-	687.1
Korea, R.	-	-	2.0	2.0	2.0	-	-	-	2.0	13.2	-	15.2
Morocco	6.8	-	-	6.8	6.8	-	-	-	6.8	2.0	-	8.8
Pakistan	76.3	57.1	13.6	147.0	147.0	-	-	-	147.0	40.4	-	187.4
Philippines	-	27.2	-	27.2	27.2	-	-	-	27.2	-	-	27.2
Romania	38.0	58.4	30.0	126.4	126.2	0.2	-	-	126.4	223.0	-	349.4
Zambia	34.2	-	-	34.2	34.2	-	-	-	34.2	-	-	34.2
Sub-total	544.7	582.2	142.1	1269.0	1265.1	3.9	-	-	1269.0	597.5	-	1866.5
GRAND TOTAL	1926.5	2055.3	1782.6	5764.4	1964.3	35.0	2675.9	1089.2	5764.4	2612.1	862.3	9238.8

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

Table 8

Financial summary: 1958-1973
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1973		TOTAL (8) + (9) + (10) (11)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP		Agency		TOTAL	Unliquidated obligations	In kind balance ^{a/}	
					Monetary	In kind ^{a/}	Monetary	In kind ^{a/}				
					(1)	(2)	(3)	(4)				
<u>Country programmes:</u>												
Afghanistan	74.9	76.1	58.0	209.0	70.1	-	85.8	53.1	209.0	1.4	-	210.4
Albama	12.4	52.1	15.1	79.6	-	-	66.3	13.3	79.6	3.6	3.5	86.7
Algeria	13.2	-	62.1	75.3	19.4	-	48.9	7.0	75.3	7.9	-	83.2
Argentina	616.8	373.5	521.6	1511.9	514.6	0.6	668.4	328.3	1511.9	86.0	27.7	1625.6
Austria	62.0	13.8	120.7	196.5	-	-	132.6	63.9	196.5	-	-	196.5
Bangladesh	-	25.6	10.9	36.5	-	-	29.1	7.4	36.5	18.3	26.6	81.4
Bolivia	125.4	148.8	118.6	392.8	116.7	-	204.0	72.1	392.8	10.5	8.7	412.0
Brazil	816.5	412.7	546.8	1776.0	788.9	-	682.7	304.4	1776.0	48.8	8.5	1833.3
Bulgaria	19.1	144.4	379.9	543.4	67.3	-	328.6	147.5	543.4	31.4	30.5	605.3
Burma	435.5	260.4	119.7	815.6	445.2	-	302.6	67.8	815.6	46.6	2.7	864.9
Cameroon	209.0	74.1	16.0	299.1	202.4	-	94.2	2.5	299.1	8.2	7.5	314.8
Chile	316.2	180.8	219.6	716.6	179.6	-	383.4	153.6	716.6	2.5	3.2	722.3
China	229.7	166.2	554.9	950.8	281.5	-	307.7	361.6	950.8	-	-	950.8
Colombia	216.3	188.2	146.8	551.3	132.0	-	179.9	239.4	551.3	18.4	14.2	583.9
Costa Rica	27.4	20.2	16.6	64.2	-	-	44.9	19.3	64.2	19.1	11.2	94.5
Cuba	92.5	116.0	20.4	228.9	16.0	-	185.1	27.8	228.9	105.5	20.6	355.0
Cyprus	64.5	97.2	21.2	182.9	24.1	-	140.2	18.6	182.9	16.1	4.1	203.1
CSSR	-	-	351.8	351.8	4.8	-	222.2	124.8	351.8	10.3	35.9	398.0
Ecuador	47.0	46.6	68.2	161.8	35.5	-	71.2	55.1	161.8	-	-	161.8
Egypt, A.R.	309.0	388.8	716.4	1414.2	301.8	0.8	626.7	484.9	1414.2	99.1	76.5	1589.8
El Salvador	41.1	36.1	20.7	97.9	14.1	-	30.9	52.9	97.9	6.2	-	104.1
Ethiopia	59.3	45.8	24.3	129.4	44.8	-	61.0	23.6	129.4	2.4	-	131.8
Ghana	257.0	180.9	115.6	553.5	152.7	-	341.6	59.2	553.5	27.9	6.8	588.2
Greece	571.1	124.7	439.9	1135.7	379.7	-	479.8	276.2	1135.7	41.7	38.7	1216.1
Guatemala	54.7	54.2	35.8	144.7	56.2	-	57.6	30.9	144.7	-	26.4	171.1
Haiti	0.9	-	-	0.9	-	-	0.9	-	0.9	-	-	0.9
Hong Kong	20.0	51.1	-	71.1	-	-	71.1	-	71.1	16.8	-	87.9
Hungary	56.2	333.0	484.6	873.8	130.0	-	579.4	164.4	873.8	37.1	25.1	936.0
Iceland	29.0	72.1	25.9	127.0	-	-	74.6	52.4	127.0	-	-	127.0
India	110.7	275.5	914.2	1300.4	255.5	3.6	472.7	568.6	1300.4	24.7	48.8	1373.9
Indonesia	424.5	224.9	620.3	1269.7	261.7	-	528.3	479.7	1269.7	75.3	10.2	1355.2
Iran	558.7	72.0	379.6	1010.3	450.4	0.5	338.1	221.3	1010.3	7.0	28.2	1045.5
Iraq	342.8	110.7	435.1	888.6	242.5	-	391.5	254.6	888.6	146.1	24.9	1059.6
Israel	182.4	276.8	179.2	638.4	119.3	-	340.8	178.3	638.4	20.8	15.5	674.7
Italy	9.0	-	160.1	169.1	-	-	95.6	73.5	169.1	-	-	169.1
Ivory Coast	45.6	17.0	2.9	65.5	62.3	-	3.2	-	65.5	0.2	-	65.7
Jamaica	41.1	21.5	16.6	79.2	10.4	-	49.1	19.7	79.2	4.2	-	83.4
Japan	50.1	-	322.3	372.4	49.8	-	129.4	193.2	372.4	-	-	372.4
Jordan	34.4	20.2	38.4	93.0	54.9	-	27.6	10.5	93.0	13.2	4.7	110.9
Kenya	31.9	92.4	14.8	139.1	27.4	-	68.9	42.8	139.1	-	-	139.1
Khmer Republic	85.0	29.3	1.7	116.0	39.1	-	69.6	7.3	116.0	-	-	116.0
Korea, R.	311.7	153.0	739.5	1204.2	117.2	-	561.2	525.8	1204.2	64.9	28.9	1298.0
Kuwait	5.5	-	3.9	9.4	-	-	9.4	-	9.4	-	-	9.4
Lebanon	143.2	107.9	48.4	299.5	76.0	-	205.3	18.2	299.5	28.3	5.0	332.8
Liberia	87.7	15.8	-	103.5	42.7	17.8	27.6	15.4	103.5	3.3	14.4	121.2
Libyan A.R.	0.4	7.7	-	8.1	-	-	8.1	-	8.1	-	-	8.1
Madagascar	16.7	24.3	20.3	61.3	-	-	61.3	-	61.3	2.0	-	63.3
Malaysia	37.2	30.6	29.5	97.3	1.6	-	72.3	23.4	97.3	21.2	4.7	123.2
Mali	16.0	16.1	-	32.1	2.1	-	30.0	-	32.1	14.9	-	47.0
Mexico	543.6	258.2	239.0	1040.8	384.0	-	511.6	145.2	1040.8	53.2	7.5	1101.5
Morocco	276.1	136.4	94.5	507.0	115.9	-	351.1	40.0	507.0	65.6	3.4	576.0
Netherlands	-	-	17.8	17.8	-	-	10.8	7.0	17.8	-	-	17.8
New Zealand	-	-	37.2	37.2	-	-	26.2	11.0	37.2	-	-	37.2
Nicaragua	13.9	7.4	20.1	41.4	-	-	41.4	-	41.4	-	-	41.4
Nigeria	178.6	122.5	84.1	385.2	110.7	-	213.1	61.4	385.2	20.5	-	405.7
Norway	-	-	9.6	9.6	-	-	5.3	4.3	9.6	-	-	9.6
Pakistan	429.0	299.6	521.6	1250.2	263.9	-	636.8	349.5	1250.2	73.9	52.0	1376.1
Panama	17.1	10.6	29.0	56.7	4.1	-	23.6	29.0	56.7	-	-	56.7
Paraguay	10.3	4.6	32.1	47.0	-	-	31.3	15.7	47.0	-	-	47.0
Peru	204.3	199.7	59.5	463.5	116.4	-	207.3	139.8	463.5	4.9	25.0	493.4

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1973		TOTAL (8) + (9) + (10)
	Experts	Equip- ment	Fellow- ships	TOTAL	UNDP		Agency		TOTAL	Unliquidated obligations	In kind balance ^{a/}	
					Monetary	In kind ^{a/}	Monetary	In kind ^{a/}				
					(1)	(2)	(3)	(4)				
Philippines	330.7	434.6	824.6	1589.9	416.2	8.9	590.2	574.6	1589.9	52.7	28.7	1671.3
Poland	19.6	209.3	680.1	909.0	194.1	-	475.3	239.6	909.0	56.4	26.5	991.9
Portugal	57.5	45.9	37.7	141.1	-	-	88.9	52.2	141.1	-	-	141.1
Rhodesia	2.2	17.8	7.6	27.6	25.4	-	2.2	-	27.6	-	-	27.6
Romania	51.5	201.2	370.5	623.2	57.8	-	394.9	170.5	623.2	61.9	33.5	718.6
Saudi Arabia	18.8	2.9	10.5	32.2	-	-	25.2	7.0	32.2	-	-	32.2
Senegal	113.0	96.9	15.3	225.2	86.5	0.8	137.0	0.9	225.2	0.2	-	225.4
Sierra Leone	76.4	16.4	18.9	111.7	39.9	-	57.8	14.0	111.7	0.7	-	112.4
Singapore	81.4	68.8	16.5	166.7	-	-	140.9	25.8	166.7	15.1	5.5	187.3
South Africa	-	-	107.8	107.8	-	-	42.1	65.7	107.8	-	-	107.8
Spain	-	-	61.1	61.1	-	-	38.0	23.1	61.1	-	-	61.1
Sri Lanka	256.9	197.0	68.5	522.4	105.9	-	333.7	82.8	522.4	20.8	3.3	546.5
Sudan	171.9	76.9	58.6	307.4	27.7	-	270.5	9.2	307.4	11.2	-	318.6
Syrian A. R.	61.7	46.7	66.4	174.8	23.6	-	119.5	31.7	174.8	13.5	12.8	201.1
Tanzania, U. R.	6.8	-	2.8	9.6	9.6	-	-	-	9.6	0.9	-	10.5
Thailand	698.2	218.5	824.6	1741.3	512.0	-	723.7	505.6	1741.3	114.3	21.0	1876.6
Tunisia	192.7	99.9	149.3	441.9	141.2	-	264.6	36.1	441.9	5.4	-	447.3
Turkey	602.3	265.7	595.1	1463.1	438.1	-	628.5	396.5	1463.1	23.5	34.1	1520.7
Uganda	177.2	80.3	14.1	271.6	131.0	-	133.5	7.1	271.6	-	-	271.6
Uruguay	109.4	285.3	69.6	464.3	152.2	-	241.2	70.9	464.3	48.2	2.8	515.3
Venezuela	209.5	42.6	197.5	449.6	64.2	-	216.9	168.5	449.6	41.8	-	491.4
Viet-Nam	74.4	122.2	117.1	313.7	31.4	-	142.5	139.8	313.7	15.9	12.2	341.8
Yugoslavia	172.7	301.7	735.8	1210.2	463.1	-	495.1	252.0	1210.2	44.3	10.6	1265.1
Zaire, R.	205.8	64.9	71.4	342.1	9.6	-	307.7	24.8	342.1	13.2	18.5	373.8
Zambia	66.6	42.2	14.8	123.6	-	-	113.4	10.2	123.6	1.5	1.2	126.3
Other countries ^{b/}	13.4	1.6	116.2	131.2	1.8	-	65.0	64.4	131.2	-	-	131.2
Sub-total	12754.8	9157.4	15555.8	37468.0	9716.6	33.0	18098.2	9620.2	37468.0	1851.5	862.3	40181.8
<u>Intercountry programmes</u>												
Africa	67.2	55.8	39.3	162.3	154.1	2.5	5.7	-	162.3	-	-	162.3
Asia and the Far East	342.0	105.2	170.9	618.1	483.1	41.4	79.1	14.5	618.1	23.7	-	641.8
Europe	21.0	18.6	17.3	56.9	56.9	-	-	-	56.9	-	-	56.9
Latin America	237.8	95.3	122.3	455.4	400.5	16.7	36.6	1.6	455.4	7.5	-	462.9
Middle East	5.8	1.2	5.3	12.3	12.3	-	-	-	12.3	-	-	12.3
Interregional projects	580.5	304.8	1765.2	2650.5	1059.3	21.5	1301.2	268.5	2650.5	131.9	-	2782.4
Trieste Centre	-	-	210.0	210.0	-	-	210.0	-	210.0	-	-	210.0
Sub-total	1254.3	580.9	2330.3	4165.5	2166.2	82.1	1632.6	284.6	4165.5	163.1	-	4328.6
Miscellaneous	95.4	12.2	0.9	108.5	23.2	-	85.3	-	108.5	-	-	108.5
<u>UNDP large-scale projects</u>												
Argentina	49.2	4.6	4.0	57.8	57.8	-	-	-	57.8	6.4	-	64.2
Brazil	92.8	119.3	36.8	248.9	245.2	3.7	-	-	248.9	75.0	-	323.9
Chile	40.5	-	6.1	46.6	46.6	-	-	-	46.6	12.3	-	58.9
Egypt, A. R.	-	23.4	7.3	30.7	30.7	-	-	-	30.7	30.4	-	61.1
Greece	258.6	62.7	9.1	330.4	330.4	-	-	-	330.4	19.8	-	350.2
Hungary	0.3	-	-	0.3	0.3	-	-	-	0.3	-	-	0.3
India	561.6	1136.5	111.2	1809.3	1809.3	-	-	-	1809.3	175.0	-	1984.3
Korea, R.	-	-	2.0	2.0	2.0	-	-	-	2.0	13.2	-	15.2
Morocco	6.8	-	-	6.8	6.8	-	-	-	6.8	2.0	-	8.8
Pakistan	203.3	242.8	13.6	459.7	459.7	-	-	-	459.7	40.4	-	500.1
Philippines	133.4	260.9	83.1	477.4	475.0	2.4	-	-	477.4	-	-	477.4
Romania	42.6	105.9	30.0	178.5	178.3	0.2	-	-	178.5	223.0	-	401.5
Turkey	27.5	284.1	-	311.6	311.6	-	-	-	311.6	-	-	311.6
Yugoslavia	199.3	318.0	70.6	587.9	587.9	-	-	-	587.9	-	-	587.9
Zambia	86.6	3.1	-	89.7	89.7	-	-	-	89.7	-	-	89.7
Central America	409.3	575.9	9.4	994.6	985.3	9.3	-	-	994.6	-	-	994.6
Sub-total	2111.8	3137.2	383.2	5632.2	5616.6	15.6	-	-	5632.2	597.5	-	6229.7
GRAND TOTAL	16216.3	12887.7	18270.2	47374.2	17522.6	130.7	19816.1	9904.8	47374.2	2612.1	862.3	50848.6

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

^{b/} Includes the following countries which have not received technical assistance during the last ten or more years: Denmark, Finland, France, Germany, F. R., Monaco, Sweden, Switzerland and the United States.

ANNEX II

ASSISTANCE IN KIND FOR AGENCY TECHNICAL CO-OPERATION PROGRAMMES

A. Estimated value of the assistance in kind made available to the Agency in 1973

Donor	Assistance made available	Value \$
Argentina	Training for eight Type II fellowship award holders	13 900
Australia	One lecturer	100
Austria	Training for four Type II fellows	12 200
Belgium	Training for eight Type II fellows	17 100
Brazil	Training for three Type II fellows	1 200
Canada	Two lecturers	500
CSSR	One lecturer and training for three Type II fellows	4 600
Denmark	One lecturer and training for six Type II fellows	10 500
Finland	One lecturer and equipment for a project in one country	14 600
France	One expert, three lecturers, equipment for projects in two countries and training for 16 Type II fellows	62 100
Germany, F. R.	One expert, two lecturers, equipment for a project in one country, training for 29 Type II fellows and stipends for training course participants	171 500
Hungary	Training for three Type II fellows	2 400
India	One lecturer and training for 13 Type II fellows	15 500
Israel	Training for five Type II fellows	3 900
Italy	Training for 26 Type II fellows	39 900
Japan	One expert, one lecturer and training for nine Type II fellows	13 600
Netherlands	Two experts and training for 11 Type II fellows	39 000
Philippines	Training for two Type II fellows	1 500
Poland	Two lecturers and training for nine Type II fellows	16 800
Romania	Training for one Type II fellow	1 400
Spain	Training for ten Type II fellows	14 200
Sweden	Eleven lecturers, equipment for a training course, training for nine Type II fellows and stipends for training course participants	61 900
USSR	Training for five Type II fellows	13 400
UK	One expert and four lecturers	5 000
USA	Three experts, seven lecturers, equipment for projects in 19 countries, training for 79 Type II fellows and stipends for training course participants	583 600
Yugoslavia	Training for two Type II fellows	1 600
Joint Institute for Nuclear Research, Dubna, USSR	Training for one Type II fellow	2 200
TOTAL	Nine experts, 37 lecturers, equipment for projects in 21 countries and one training course, training for 262 Type II fellows and participant stipends for four training courses	1 124 200

B. Possible assistance to projects not included in the 1973 regular programme owing to lack of funds

Requesting country	Title of the project	Possible supplier	Nature of offer	Value of the assistance provided
Indonesia	Reactor radiation measurements	Australia	An expert and equipment	Not known
		Germany, F.R.	An expert and equipment	Not known
Korea, R.	Use of radioisotopes in industry	France	Equipment and fellowship training	Not known
Korea, R.	Plant breeding	Germany, F.R.	An expert	Not known
Mexico	Waste management	South Africa	An expert	Not known

Note: Following the procedure suggested by the Technical Assistance Committee (TAC) of the Board of Governors, the Director General, in a circular letter of 29 March 1973, brought to the attention of the technically advanced Member States the 34 requests for expert services and equipment which could not be submitted for approval to TAC - as a part of the 1973 regular programme of technical assistance - for lack of funds, requesting those Member States to consider the possibility of meeting such requests through the Agency or on a bilateral basis by gift, loan or otherwise and informed them that details of the assistance needed would be provided on request. The Agency provided more detailed information on the four projects mentioned above.

ANNEX III

INTERCOUNTRY PROJECTS: 1973

Title	Place and dates	Source of funds	Participation ^{1/}		
			(1)	(2)	(3)
Regional seminar on the application of nuclear techniques in agriculture	Bombay, Izatnagar, Karnal, New Delhi and Srinagar, India 2-20 April	UNDP	22	-	2
Study tour on waste management techniques and environmental protection	CSSR, Poland and USSR 7 May to 15 June	Regular programme	25	-	-
Advanced regional training course on radiological health and safety measures	Athens, Greece 4-22 June	UNDP	14	1	6
Interregional training course on the use of radioisotopes and radiation in entomology	Gainesville, Florida, USA 2 July to 24 August	Regular programme and USA	16	2	-
Interregional training course on the use of tracer techniques in industry and environmental pollution studies	Raleigh, North Carolina, USA 9 July to 3 August	Regular programme and USA	20	1	-
Interregional training course on the theoretical principles and practical techniques of isotope hydrology	Heidelberg, Germany, F. R. 14 August to 14 December	Regular programme and Germany, F. R.	8	-	-
Study tour on radiation dosimetry in medicine and biology	USSR 20 August to 14 September	Regular programme	28	-	-
Interregional training course on the maintenance and repair of nuclear electronic equipment	ILO Centre, Turin, Italy 3 September to 30 November	UNDP	14	1	-
Interregional training course on the use of nuclear techniques in animal parasitology and immunology	Zemun, Yugoslavia 1-26 October	SIDA	15	-	5
Regional seminar on the use of isotope techniques in water resources inventory, planning and development	Mexico City, Mexico 12-23 November	UNDP	13	-	14
Regional survey and briefing course on the technical and economic aspects of nuclear power development	Bangkok, Thailand 3-18 December	UNDP	28	2	7

^{1/} 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 them.

ANNEX IV

IAEA ISOTOPE HYDROLOGICAL SERVICES: UNDP SUBCONTRACTS IN 1973^{1/}

Country and project number	Title	Cost of subcontracted services
Bolivia BOL-68-514	Groundwater development in the Altiplano (United Nations)	\$2 150
Jamaica JAM-70-512	Development and management of water resources (FAO)	1 440
Mali MLI-67-507	Strengthening government services for groundwater exploration and development (United Nations)	770
Mauritania MAU-67-502	Strengthening of the groundwater service (United Nations)	310
Qatar QAT-71-501	Hydro-agricultural resources survey (FAO)	530
Spain SPA-69-515	Scientific study of water resources in the Canary Islands (UNESCO)	4 780
Togo TOG-70-511	Groundwater exploration in the coastal region (United Nations)	2 590
	TOTAL	\$12 570

^{1/} The organization for which the subcontract was carried out is given following the project title.

ANNEX V
EXPERTS' FINAL REPORTS^{1/}

Reference number	Name of expert	Subject	Country of assignment
797	K. E. Collins	Hot atom chemistry	Indonesia
798	A. Kostikas	Mössbauer effect studies	Korea, R.
799	O. P. Kamra	Plant breeding	Indonesia
800	E. R. Gardner	Radiochemistry	Thailand
801	R. H. Ritchie	Radiation safety	India
802	C. N. Desai	Radioisotope production	Thailand
805	B. Q. Ward	Food preservation	Indonesia
806	T. Hayes	Radioisotope production	Iran
807	H. J. M. Bowen	Activation analysis for gold and the platinum metals	Bulgaria
808	G. J. Sauzay	Use of artificial radioactive tracers in sedimentology	Mexico
809	P. Amardeil	Radiation protection ^{2/}	Uruguay
810	H. Kristensen C. Emborg	Microbiological aspects of radiation sterilization	Argentina
811	A. G. Maddock	Radiochemistry	Chile
813	E. de Jong	Radioisotopes in agriculture	Uganda
814	K. Kaellstroem	Testing of metal components of nuclear fuel elements	Argentina
815	J. Galateanu	Production of labelled compounds	Colombia
816	J. Lopez-Morales	Nuclear fuel analysis ^{2/}	Mexico
817	R. H. Krishnan	Hot cell installation	Indonesia
818	H. Altmann	Pesticide residues	Hungary
819	M. Gembicki	Use of radioisotopes in medicine	Sri Lanka
820	R. Guiraud	Use of radioisotopes in agriculture ^{3/}	Senegal
821	I. G. Valencia	Use of radioisotopes in agriculture	Korea, R.
822	J. Robinson	Heat measurement and heat transfer laboratory	Brazil
823	H. E. Makowski	Radiochemistry ^{3/}	Zaire
824	W. Mulligan	Antihelminthic immunity	Yugoslavia
825	G. Pregl	Neutron physics	Turkey

^{1/} 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.

^{2/} Available in Spanish only.

^{3/} Available in French only.

Reference number	Name of expert	Subject	Country of assignment
826	A. Plata-Bedmar	Isotope hydrology ^{2/}	Colombia
827	A. Zuber	Radioisotopes in hydrology	Brazil
828	G. Boehme	Reactor fuel elements - hot cell design	Argentina
829	E. B. Bell	Use of radioisotopes in industry	India
830	E. Touya	Use of radioisotopes in medicine ^{2/}	Costa Rica
831	J. Moustgaard	Protein metabolism in farm animals	Yugoslavia
832	N. Ortin	Food irradiation ^{2/}	Uruguay
833	H. Schanzel	Evaluation of acaricides for cattle tick control	Uganda
834	T. Radoszewski	Standardization of radionuclides	Indonesia
835	E. M. Tilton	Feasibility study for conducting research on the control of <i>Cadra cautella</i> in cocoa beans by the sterile-male technique	Ghana
836	R. Hoeschl	Medical applications of radioisotopes	Sierra Leone
837	S. Hellstroem	Nuclear instrumentation	Ghana
839	R. Kokke	Radioisotopes in microbiology	Hungary
840	E. T. Chulick	Neutron physics	Greece
841	D. O'Connell	Radiation dosimetry	Turkey
842	J. Moustgaard	Nuclear techniques and animal science research	Brazil
843	J. Burdon	Instrumentation	Ghana
844	T. J. Burnett J. D. McCullen W. Schwarzer C. Sennis	Reactor siting and safety	Mexico
845	D. Geithoff	Non-destructive testing of fuel elements in hot cells	Argentina
846	J. A. K. Quartey	Atomic energy planning	Libyan Arab Republic
847	G. Henke	Establishment of a radioisotope laboratory in the Faculty of Pharmacy, Cairo University	Egypt, A. R.
848	T. Dippel	Plutonium laboratory	Argentina
849	J. Farkas	Irradiation of dates	Iraq
850	M. E. Wacks	Activation analysis	Thailand
851	R. Taecker	Nuclear engineering	Philippines
852	K. E. Britton	Use of radioisotopes in medicine	Malaysia
853	A. M. Ghose	Neutron physics	Burma

Reference number	Name of expert	Subject	Country of assignment
854	R. G. Deshpande	Hot cell installation	Indonesia
855	J. Laizier	Radiation polymerization chemistry	Indonesia
856	H. D. Jamieson	Use of radioisotopes in medicine	Malaysia
857	K. E. Britton	Use of radioisotopes in medicine	Thailand
858	J. D. McCullen D. Risse C. Sennis	Safety mission on the proposed Laguna Verde nuclear power plant	Mexico
859	N. M. Soonawala Ko	Airborne gamma ray spectrometer survey, Sivrihisar area, and radon survey, Koprubasi area	Turkey
860	D. Brune	Activation analysis techniques	Peru
861	J. Tupy	Plant physiology ^{3/}	Ivory Coast
862	J. P. Karger	Nuclear power	Iran
863	U. V. Rocca	Design of nuclear fuel elements	Argentina
864	G. W. C. Tait	Reactor health physics	Iran
865	J. Gassmann	Neutron diffraction	Greece
866	W. Wolf	Quality control of radiopharmaceuticals	Romania
867	R. H. Filby	Radiochemistry	Bulgaria
868	J. H. Freeman	Nuclear instrumentation	Israel
869	W. Wolf	Teaching of radiopharmacy	Israel
870	W. Bock-Werthmann	Activation analysis	Poland
872	K. Boddy	Radiation protection	Bulgaria
873	A. Poulouvassilis	Radioisotopes in agriculture	Cyprus
874	J. Furet	Cairo Nuclear Studies Centre at Inshas	Egypt, A. R.
875	F. Massaux	Application of radioisotopes in agriculture ^{3/}	Cameroon
876	W. J. Krause	Burn-up measurement techniques	Argentina
877	C. Capdevilla	Emission spectroscopy ^{2/}	Argentina
878	J. C. Webb	Development of nuclear technology	Venezuela
879	A. M. Vilquin	Waste disposal	Yugoslavia
880	K. Boening	Radiation damage	Greece
881	T. Florkowski	Radioisotopes in hydrology	Yugoslavia
882	M. E. Wacks	Nuclear engineering	Thailand
883	S. Gangadharan	Activation analysis	Thailand
884	J. K. Haywood	Activation analysis	Thailand

Reference number	Name of expert	Subject	Country of assignment
885	G. W. Gee	Use of radioisotopes in agriculture	Sri Lanka
887	P. H. Holmes	Use of radioisotopes and radiation in medical and veterinary parasitology	Ethiopia
888	W. T. Graban	Radioisotopes in medicine	Turkey
889	W. Jennings	Food irradiation	Bulgaria
890	S. Alvarado	Nuclear engineering ^{2/}	Cuba
891	T. K. Ball	Prospecting for nuclear raw materials	Nigeria
892	A. P. Perkons	Activation analysis	India
893	I. Friedman	Development of agricultural production through the application of nuclear techniques	Brazil
894	H. M. Hassan	Radioisotopes in agriculture	Syria

