THE PROVISION OF TECHNICAL ASSISTANCE BY THE AGENCY WITH SPECIAL REFERENCE TO 1972

Report by the Director General

GC(XVII)/INF/142

Printed by the
International Atomic Energy Agency
in Austria - July 1973

INTERNATIONAL ATOMIC ENERGY AGENCY

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List of abbreviations

Agency	International Atomic Energy Agency
ECOSOC	Economic and Social Council of the United Nations
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
U_3O_8	Uranium oxide
WHO	World Health 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:

Code	Field of activity
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 1972; 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, and UNDP funds, for the provision of technical assistance is reviewed in this document, in which data are also provided on UNDP assistance in respect of large-scale projects for which the Agency was the executing agency. In addition, information is given in Annex IV with regard to the UNDP projects for which the Agency served as sub-contractor in 1972.

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 1972, 71 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]. More than 70% of all assistance provided related to the application of isotopes and radiation in agriculture, nuclear engineering and technology, and medicine, to the subjects covered by the classification heading "Other fields of application of isotopes and radiation" and to prospecting, mining and processing of nuclear materials.

5. The assistance, including assistance in kind, was provided through the services of 232 experts, lecturers and visiting professors, the supply of equipment to a value of about $1 922 000, and 513 fellowship awards for individual study, scientific visits, three study tours and other short-term training projects.

6. The resources allocated for carrying out the Agency's 1972 technical assistance programme amounted to approximately $6 200 000 (Table 1), whereas the total value of the technical assistance actually provided in 1972 was about $5 500 000 (Tables 4 and 7), which includes payments against 1972 and prior years' obligations, as well as assistance in kind, and represents an increase of more than $550 000 or 11% over the sum of $4 945 000 provided in 1971 (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 1972, followed by information concerning other developments relating to technical assistance.

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

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

[3] See, for example, document GC(XVI)/INF/137.

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

8. 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 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].

9. Much has happened since 1958, and newly discovered sources of fossil fuel have mitigated the urgency of the need for developing countries to commit substantial national resources for the training of staff and the building and equipping of new facilities in preparation for the introduction of nuclear power. Nevertheless, the gradual build-up of nuclear scientific and engineering expertise in developing countries, including the experience gained in the operation of research reactors, has placed numerous developing countries in the position of being able to consider the introduction of nuclear power as a realistic alternative to other forms of power when drawing up national energy plans. In this connection, the exploitation of domestic sources of uranium ore from which reactor fuel can be made represents a decisive factor.

10. In 1971 and 1972, the technical sub-field of activity for which most assistance was provided was prospecting for nuclear raw materials, and this has made it desirable to review the present situation and the Agency's capability to aid its Member States. For example, in assessing the technical assistance needs of developing countries in this important area, account is taken of the economic impact which the exploration for and the development of nuclear raw materials - primarily uranium - may have on a country's over-all economy and of the requirements for uranium elsewhere in the world during the next few decades.

11. In regard to the world situation, the overriding factor in determining the future demand for uranium is the rate of installation of nuclear power plants for the generation of electricity. Of the 40 000 MW(e) of nuclear power generating capacity estimated to have been installed at the end of 1972, somewhat less than 1000 MW(e), or approximately $2\frac{1}{2}\%$ of the total, was located in developing countries. It is estimated that by 1980, 300 000 MW(e) of new nuclear power generating capacity will have been installed in the industrialized countries, and that the capacity in developing countries is unlikely to exceed 30 000 MW(e), or less than 10% of the total. From these figures it can be seen, however, that a thirty-fold increase in nuclear power generating capacity in developing countries over the period in question is expected.

12. Many of the more industrialized countries, such as Japan, the United Kingdom and other western European countries, which will have the largest increases in nuclear power, have already been surveyed for uranium and, up to now, their resources appear to be deficient. Such countries will therefore be increasingly dependent on imported supplies, and the uranium requirements of the developing countries will also increase.

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

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

[6] Ibid., para. 9.

13. Forecasts of reactor fuel needs until the end of the present century show that there will be a very large and increasing annual demand from the late 1970s onwards. Although recent discoveries and the existing substantial reserves have had a depressing effect on the world market, the future long-term requirements for uranium will be considerable and it is estimated that it will be necessary to discover and prove a further one and a half million tons before 1992 to satisfy demands up to and including the year 2000. The magnitude of the effort needed is illustrated by the fact that the equivalent of several thousand million dollars will have to be spent during the remainder of this century on exploration and the uranium found is expected to have a value about ten times greater than the exploration costs.

14. At the present time only 17 countries are known to have reserves exceeding 1000 tons of U_3O_8 that can be exploited at relatively low cost, and about 90% of these "low cost" uranium reserves is located in five advanced countries. To some extent this situation is reflected in the amount invested by countries in uranium exploration, and it is to be noted that the amount invested for this purpose in developing countries over the last twenty years has been relatively small in comparison with the total investment. Future requirements for uranium are certain to change this situation; there may be geological limitations to further extensive discoveries in the five principal uranium-producing countries and this would lead to increased exploration in developing countries where many geologically favourable areas remain to be explored.

15. Developing countries could benefit in two ways if economically exploitable uranium deposits were found within their territories, first by utilizing their own uranium resources to fuel national nuclear power stations, and secondly through commercial export. In the first case, a country's uranium resources programmes should be related to its future electrical power needs and be based on the assurance that nuclear power could with benefit, be integrated into its electrical power system. The discovery of low-cost uranium would, of course, be desirable; however, in the interest of saving foreign currency, utilizing national resources, establishing an industry, and for politico-strategic reasons, Governments in developing countries may be prepared to exploit national uranium reserves even if that would entail paying a premium above world uranium prices. This is the situation in a number of the technically more advanced developing countries. The second case would involve the sale of uranium, like any other raw material, on the competitive world market; for example, Gabon and Niger, which have substantial uranium reserves, have entered into supply contract agreements with foreign consumer organizations.

1. The Agency's capability to provide assistance

16. As stated above, many geologically favourable areas in developing countries remain to be explored, and some of those countries have already undertaken or are considering uranium exploration programmes. The funds and technical manpower required to carry out such programmes often make it attractive - at least in the initial stages - to use assistance from other countries, from private companies as concession contractors or partners, or from the Agency, to initiate and implement uranium exploration and development programmes.

17. In conformity with Article II of its Statute, which lays down that it "shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world", the Agency, since 1958, has been concerned with nuclear raw materials aid programmes covering all aspects of the uranium production industry. Because of its specialized facilities and experienced staff at Headquarters and its connections with uranium specialists and associated organizations in all parts of the world, the Agency is able to provide advisory services and technical support for technical assistance programmes on uranium exploration and development upon request.

18. The Agency's assistance in this area has included the provision of advisory missions, expert services, equipment and supplies and fellowship training, as well as the execution of large-scale UNDP projects for individual countries; in addition, the Agency has conducted training courses on a regional and interregional basis. The distribution of the experts and equipment provided by the Agency for the development of nuclear raw materials resources over the period 1959-1972 and projected for 1973 is given in the chart following paragraph 22 below. It can be seen that 75 experts were sent to 29 countries and four lecturers were provided for the two intercountry training courses by the end of 1972. Interest in the provision of experts in this area, which was considerable in the early 1960s and then declined until 1970, subsequently revived and is now greater than ever.

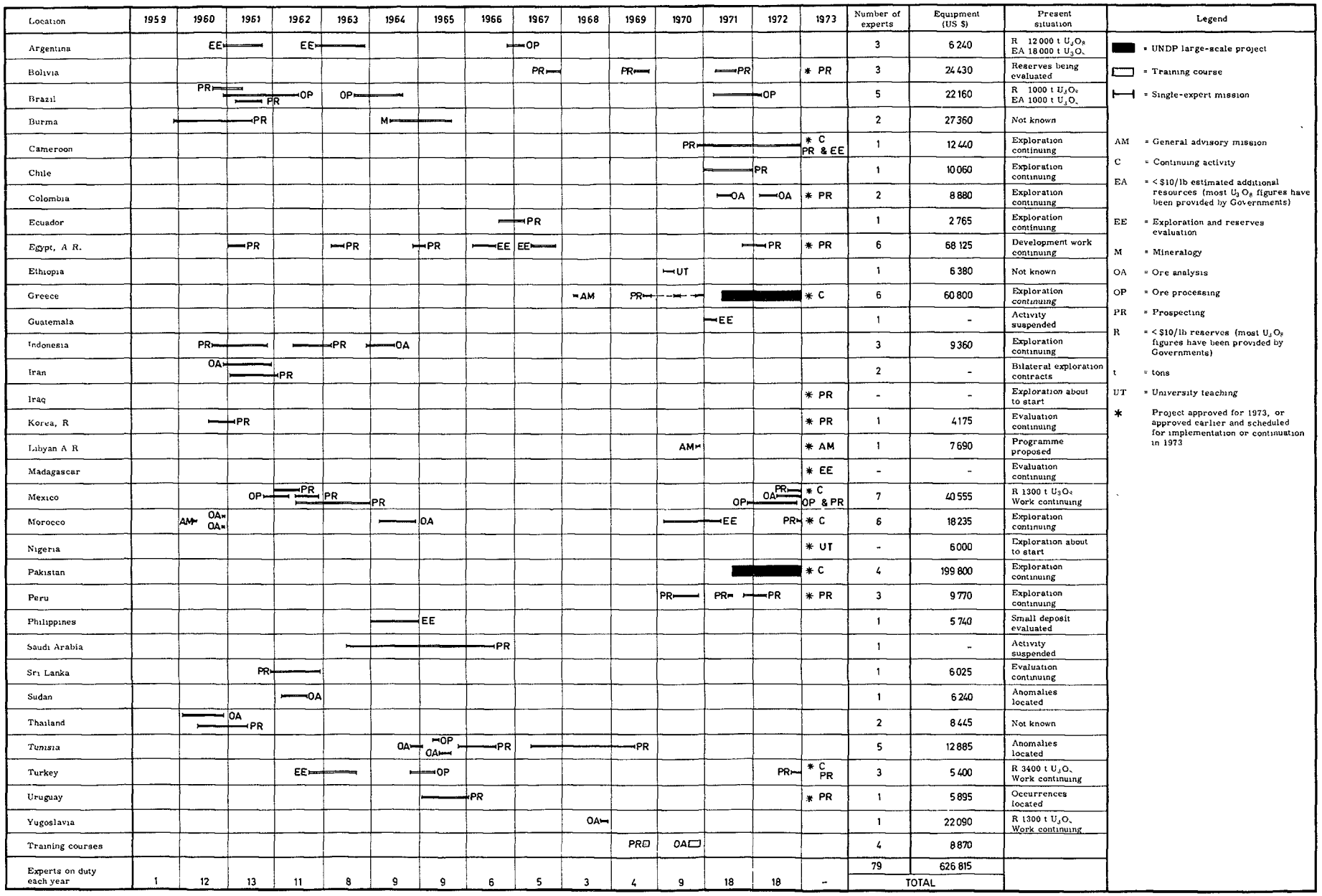
19. Advisory service missions of a few days' to a few weeks' duration can cover any aspect of this work on which a Government wishes to have advice. These missions - usually carried out by Headquarters staff - are frequently for the purpose of discussing programmes and defining technical assistance requests. For example, an advisory mission to Greece in 1968 was able to outline the requirements for the primary exploration of the Macedonia-Thrace area of northern Greece. The Greek Government used the advice provided as a basis for a request to UNDP in 1969 for a large-scale exploration project which was approved in 1971 and is now being successfully implemented.

20. Commercial organizations from the more advanced countries have increasingly shown interest in obtaining concessions, covering uranium exploration and export, in developing countries; properly controlled, the award of concessions of this kind can bring considerable economic benefits. The Governments of some developing countries, however, when faced with such approaches, do not feel competent to evaluate their own potential reserves of nuclear raw materials and their possible domestic requirements for such resources in the future, or to decide on the details of proposed contracts. The Agency is able to provide technical, economic and legal advice in such situations. A problem of this nature arose in the Libyan Arab Republic in 1970, and the Agency was able to provide an expert to assess the situation. The area involved did indeed appear to have geologically favourable characteristics, and the Government later contracted to have an aerial radiometric survey made.

21. Experts can be provided individually or in teams, at the request of a Government, and - except for members of the Agency's staff - are recruited for specific assignments. The work done during expert assignments in two countries is described in paragraphs 22 and 23 below since the results obtained are typical of those achieved in such assignments.

22. Uranium prospection by the Turkish Government's Mineral Research and Exploration Institute began in 1953, and, although much of the country had been surveyed by 1962, no estimations of ore reserves or cost evaluations had been made. This led the Government to request the services of an Agency expert to make an independent estimation of uranium ore reserves. During his one-year assignment, the expert, when assessing the work previously done, found that in one area surveyed occurrences in recent sediments indicated a potential low-cost reserve tonnage. However, as this determination was made in 1963, and the then prevailing world demand for uranium did not make immediate exploitation of this deposit desirable, it was recommended that further work should be limited to a detailed study of the optimum uranium recovery method. The Government followed up this recommendation and in 1964-1965 a uranium-ore processing expert on a six-month assignment carried out detailed tests and recovery process evaluations. The body of ore was assessed and its exploitation was postponed pending the advent of more favourable world market conditions. As a nuclear power programme is now foreseen in Turkey, this uranium ore occurrence is assuming greater economic importance, and it is expected that the work done by the experts provided by the Agency will lead to a more substantial ore development programme by the Mineral Research and Exploration Institute, which may involve the provision of further Agency assistance.

Distribution of experts and equipment provided by the Agency for the development of nuclear raw materials resources (1959-1972 with a projection for 1973)



23. An Agency expert was provided to Ecuador, where no previous systematic uranium survey had been conducted, to study the basic geology of the country in respect of uranium ore potential and to initiate a prospection programme. In the course of his six-month assignment in 1966-1967 the expert devised a programme to outline favourable geological areas, check mineral samples, and make a preliminary, car-borne scintillometer survey over as wide an area of the country as possible. The results showed that radiometric anomalies and a high radioactive background were concentrated in the southern and south-eastern parts of the country, and that some of the anomalies merited further investigation. The availability of these preliminary survey findings provides the Government with a tool to evaluate future programmes, to be implemented either by its own staff or by contractors, or by a combination of both. In this connection it is noteworthy that foreign uranium mining organizations have recently shown an interest in this area.

24. The equipment provided by the Agency for nuclear raw materials projects has mainly consisted of radiometric prospecting and evaluation instruments, analytical equipment drills and vehicles. The value of such equipment, not including that which has been provided in respect of the two UNDP large-scale projects, had exceeded $357 000 by the end of 1972. Since the beginning of the Agency's involvement in uranium exploration there have been many improvements in techniques and instrumentation. In the Arab Republic of Egypt, for example, a total count aerial scintillometer was supplied many years ago and was used successfully to indicate anomalous but undifferentiated radioactivity from the air. During 1973 a more modern, gamma-ray spectrometer will be provided - together with an expert to supervise its installation and the training of staff - which will greatly facilitate exploration progress as this instrument can distinguish between uranium and thorium anomalies from the air, thus eliminating the need for expensive ground checking work.

25. At present the Agency is executing two UNDP large-scale projects. The first consists of exploration for uranium in Central and Eastern Macedonia and Thrace in Greece, in which geochemical prospection techniques are mainly employed, and the UNDP contribution is $353 100 for the provision of a project manager and three experts together with $60 800 for exploration equipment. The second, in which detailed exploration for uranium and other radioactive occurrences is being carried out in the Siwalik sandstones in the Dera Ghazi Khan district in Pakistan, is a drilling and ore evaluation project involving $438 600 in UNDP funds for the provision of a project manager and two experts and $199 800 for equipment. The objective of the project in Greece is primary exploration in an area never before systematically surveyed for uranium but considered to be geologically favourable for its occurrence. The principal methods being used are geochemical stream sediment surveying, car-borne scintillometry and radon surveying. The results are being analysed by computer, and new potential areas of uranium mineralization are being identified. In Pakistan, uranium occurrences in the Siwalik sandstones were previously known, and the objective of the project is to carry out intensive drilling and drill hole logging to identify the extent and quality of uranium ore reserves. This is now being successfully achieved.

26. Up to the end of 1972, 189 nuclear raw materials specialists from 35 different countries had received fellowship awards for individual study in 18 different host countries. Group training organized on a regional or interregional basis in the form of a training course, usually of two or three months' duration and held in a Member State with well established facilities for the type of work to be demonstrated, is another effective method for providing instruction in modern techniques. Two training courses of this kind have been organized in recent years, one in Argentina and one in Spain.

27. Sixteen geologists and mining engineers from the Latin American region attended the course in Argentina, which was organized in co-operation with the Raw Materials Department of the Argentine National Atomic Energy Commission. During the first month lectures were given at the Commission's headquarters in Buenos Aires and during the second month participants were in the field taking part in exploration activities such as radiometric aerial surveying, geochemical surveys, drill hole logging, mine evaluation, etc. The course held in Spain highlighted uranium ore analysis, and was attended by participants from 17 countries and all five geographic regions. Organized in co-operation

with the Department of Chemistry and Isotopes of the Spanish Nuclear Energy Board, the course's 12-week programme consisted of three parts: a field trip to various uranium mining areas and treatment plants (involving 10% of the available time); theoretical lectures and discussions on general and analytical chemistry of uranium, as well as on uranium geology, exploration, evaluation, mining and treatment (involving 15% of the time); and practical laboratory work on uranium ore analysis (taking up 75% of the time).

2. Other forms of Agency assistance

28. The Agency's multilateral assistance activities cover all work associated with uranium. In addition, the Agency acts as a clearing-house for the interchange and dissemination of information for the benefit of the developing and more industrialized countries, mainly through the organization of scientific meetings and the publication of the proceedings thereof. In recent years, panel meetings on uranium exploration geology, uranium exploration methods and low-grade uranium ore processing have taken place at the Agency's Headquarters, a symposium on uranium ore processing was held in São Paulo in 1971, and a working group jointly sponsored by the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development and the IAEA has since 1965, reviewed the world's uranium resources, production capacity and demand at roughly two-year intervals. Small groups of consultants are brought together to discuss and recommend action on specific problems. For example, the Agency recently convened a group of five consultants from Canada, the Czechoslovak Socialist Republic, France, the United Kingdom and the United States, to recommend minimum performance specifications for uranium prospecting and evaluation instruments; these recommendations were principally intended to assist organizations in developing countries to choose reliable instruments best adapted to their needs.

29. Uranium experts from many parts of the world were invited to participate in the panel meeting on uranium exploration geology held in April 1972, to consider and make recommendations on what the Agency's work programme and policy on this subject should be in future. The panel recognized that each country must take its own decision on future uranium exploration policy but called attention to the magnitude of the world exploration effort that will be required to meet the future demand for uranium and emphasized that the relatively low world market price for uranium prevailing in 1972 did not mean that uranium ore exploitation is not a worth-while investment. If a developing country were to start a new exploration programme to find uranium in economic quantities, develop it and bring it into production, the completion of the preparatory work leading to production would likely coincide with the point in time at which it appeared that demand would exceed supply.

30. The panel also noted that in the light of the current situation and the substantial future exploration requirements foreseen, the Agency obviously cannot directly influence the uranium market but that it could help countries by continuing to:

(a) Assess the demand for and availability of resources;

(b) Promote and, where possible, increase the exchange of information on uranium geology and exploration technology;

(c) Encourage and, where appropriate, support research programmes in these areas; and

(d) Provide advice and technical assistance to developing countries which have not been extensively explored but in which the opportunities for discovery of uranium appear favourable.

31. As evidence of developing countries' growing interest in uranium exploration it can be seen from the chart following paragraph 22 above that there were only two technical assistance field expert missions concerned with uranium exploration work and one brief advisory mission in 1968 but that it is now expected that the Agency will provide technical assistance to 16 countries in 1973, including the two on-going UNDP large-scale projects. In view of the fact that there will be a large and increasing uranium requirement over the next 30-50 years, until fast-breeder reactors become the dominant nuclear power source, it seems inevitable that the developing countries will become more and more involved in the uranium industry.

32. The role of the Agency in the development of nuclear raw materials and, in particular, in mineral exploration, was discussed by ECOSOC's Committee on Natural Resources at its meeting in New Delhi in February 1973 on the basis of a document submitted to it by the United Nations Secretariat. In the unanimously adopted conclusion on this subject the Committee stressed the extreme importance of the role of the Agency in undertaking surveys for nuclear metals pursuant to the terms of ECOSOC Resolution 1550 (XLIX), and thus agreed that the Resolution continued to provide a satisfactory basis for the division of responsibility between the United Nations and the Agency. Thus, as the competent United Nations organization concerned with nuclear power and uranium resources, the Agency will continue to meet the needs of its developing Member States for assistance of this kind.

B. OTHER DEVELOPMENTS

1. UNDP country and intercountry programming

33. In last year's report the new procedures for programming UNDP assistance to developing countries are described [7]. During 1972, 35 country programmes were submitted to the Governing Council of UNDP for approval and an additional 23 were scheduled to be submitted for approval in January 1973. In reviewing the first 35 country programmes, the UNDP Administration noted that participating organizations and Governments had had insufficient time to prepare for and complete the country programme exercise; it had originally been decided that the first round of country programmes must be completed by January 1974, but this completion date has now been changed to January 1975, by which time it is anticipated that 113 country programmes will have been approved.

34. Agency participation in the country programme exercise in 1972 followed procedures similar to those used in 1971. Generally, some agencies, including the IAEA, which participate in this exercise have considered their briefs, dealing with sectoral assistance, for the UNDP Resident Representative and the Government to be useful and worth-while documents. Their preparation is in fact a process in which continual updating is required and may be considered as representing part of the evaluation and assessment process referred to in paragraphs 77-84 below. However, in 1972 some concern was expressed by the organizations participating in UNDP that their briefs on sectoral assistance and comments on draft country programmes were not receiving adequate consideration at the field level. Thought is being given by the UNDP Administration to the way in which the participation of the agencies in the country programme process could be made more effective. It has also been recognized by the UNDP Administration that, for specific projects, the intended executing agency should be identified by the UNDP Resident Representative, in consultation with the Government, at the time the draft country programme is submitted to agency and UNDP headquarters for appraisal and, furthermore, that more extensive use of preparatory assistance should expedite project implementation.

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[7] GC(XVI)/INF/137, paras 13-18.

35. The Agency, in association with other executing agencies, drew attention to the unnecessary detail and complicated nature of the descriptive project documents required for individual UNDP large- and small-scale projects. The matter is being reviewed by the UNDP Administration with a view to the simplification of such documents and their speedier preparation by UNDP Resident Representatives.

36. Changes in the procedure for developing UNDP-financed intercountry (regional and interregional) projects have been referred to previously. [8] During 1972, new guidelines and priorities for these projects were established by the UNDP Administrator, in conjunction with the Governing Council. Priority will be given to intercountry projects that:

(a) Support steps leading to economic integration of countries where Governments have expressed interest in such integration;

(b) Encourage co-operation - usually by neighbouring countries - on the joint solution of common problems such as river basin development, communication links and other common resource and infrastructure developments;

(c) Provide assistance to the least developed countries;

(d) Provide technical support to relevant existing regional institutions (jointly controlled and financed by two or more countries) engaged in priority development work;

(e) Provide training and other technical facilities that are needed in a region and acceptable to participating Governments by strengthening existing national institutions through provision of technical personnel, training materials and fellowships (but not major capital investments or budget support) for the purposes of the intercountry projects;

(f) Effect economies of scale and efficiency in the use of limited funds or technical personnel by sharing the time of project personnel among several of the countries concerned where national projects would not be justified, such as in scientific research or transfer of technology;

(g) Assist in the creation of multicountry institutions which will have their own financial support, other than external aid, such as regional and subregional banks; and

(h) Promote pooling of experience and exchange of ideas regarding economic and social development problems and policies.

37. Although any type of project that qualifies for UNDP assistance can be formulated on a regional or interregional basis if supported by the prospective recipient Governments, there are five general types of intercountry projects that fall into two broad categories based on the form and degree of governmental involvement namely:

Category A: Joint development programmes and projects

(a) Economic integration schemes;

(b) Multicountry resources surveys and feasibility studies, including river basin or regional (area) development schemes; and

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[8] See, for example, document GC(XV)/INF/131, para. 14.

(c) Multicountry institutions, that is, institutions located or having headquarters in one country, but serving two or more countries;

Category B: Associated participation programmes and projects

(d) Multicountry advisers or advisory programmes, that is, projects consisting of one or more experts who are available to assist Governments throughout a region or on an interregional basis; and

(e) Regional and interregional seminars, training courses, study tours and working groups of experts.

38. At the regional level these guidelines have been further refined to suit local needs. With the exception of the region of Asia and the Far East, the introduction or application of nuclear technology on a regional basis is not always given the requisite intergovernmental priority within the framework of competing claims for the available funds. Under the procedures governing UNDP intercountry projects operating up to 1971, participating agencies received an allocation calculated on the basis of their respective percentage shares of total approved country projects during the preceding programming period. Under this system the Agency received up to $300 000 a year, which financed the cost of about ten intercountry projects, mainly training courses. The allocation of resources on a fixed percentage basis has now been given up, and each project proposal has to compete with those from other agencies. Consequently, bearing in mind the priorities in the various regions, the flow of UNDP funds for intercountry projects on the application of atomic energy has diminished abruptly. For 1973, five of these projects have been approved at an estimated cost of $189 000; UNDP financing of similar projects in 1974 is anticipated to be at approximately the same level. Since experience has shown that a most appropriate manner of introducing a new technology, such as the use of atomic energy, into developing economies is by group training, either on a regional or interregional basis, it is to be regretted that the effect of the new criteria and procedures should be a curtailment of funds for such activities and the imposition of another strain on the difficult financial situation prevailing under the Agency's regular programme of technical assistance.

2. UNDP-supported global projects

39. During 1972, the UNDP Administration gave further consideration to its general approach to future activities in respect of "global projects", and, in view of the increasing interest being shown within the international community in support of activities in the field of science and technology, it is promoting projects having global significance, which can reasonably be expected to achieve practical results within the available financial resources, and can be executed in laboratories and institutions located in developing countries.

40. Many Government programmes involving research for which external support is required, particularly in the agricultural sector, are designed to apply nuclear techniques to specifically local problems, taking into account basic research which may already have been carried out in a developed country, for example, crop improvements through mutation breeding techniques, fertilizer placement studies and experiments, and economic feasibility studies at the laboratory level on food preservation. There are, however, several problems which can probably best be tackled by a global approach and, for this purpose, participation in the programmes of the various international institutes for agricultural research established with the support of developed Member States, the International Bank for Reconstruction and Development and UNDP should yield results at a lower cost than that involved in establishing individual national institutes and programmes. For this reason,

the Agency is interested in the following UNDP global projects: research and training for the development of high quality maize at the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico; research and training for the development of improved sorghum and pennisetum millets at the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) in India; and scientific studies in economically important subjects in tropical insect biology being carried out at the International Centre for Insect Physiology and Ecology (ICIPE) in Kenya. Furthermore it is hoped that the Agency will participate fully in a co-ordinated research programme on the fate and significance of pesticide residues in food and the environment which is at present under study by UNDP with interested organizations.

3. Administrative matters

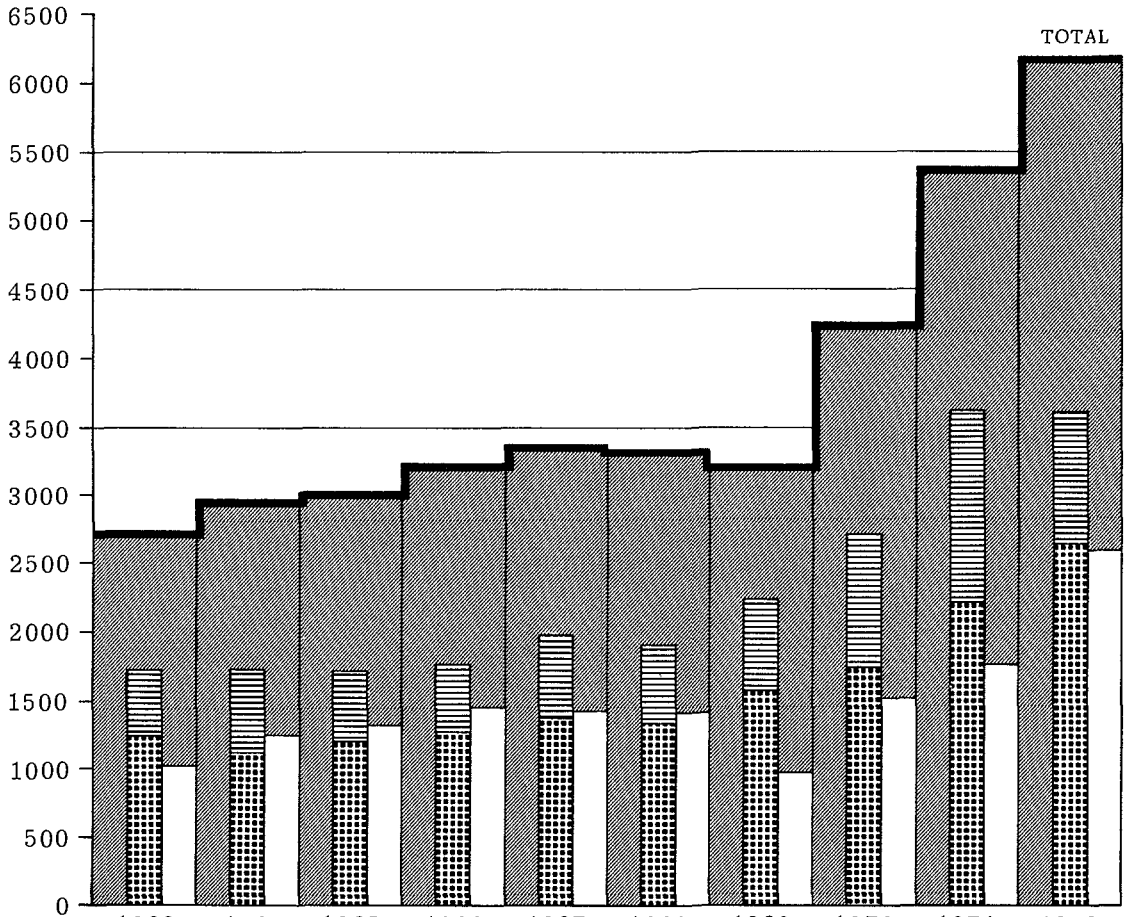
41. In 1971, the Governing Council of UNDP approved a new system of assessing local costs, which came into operation in 1972, under which such assessments would be calculated at 8% of indicative planning figures with one fifth of the amount thus assessed becoming due and payable at the beginning of each year. The Administrator of UNDP was requested to pay particular attention to those cases where an undue burden would be placed on recipient Governments should either the full or a partial assessment for local costs be made. Resolution 2768 (XXVI) of the General Assembly of the United Nations, of November 1971, contains a list of the 25 countries considered to be the least developed among the developing countries; the UNDP Administrator agreed to institute a full waiver of local costs in respect of those countries. Since the Agency harmonizes its administrative and financial management as between projects implemented under the regular programme and UNDP, waivers of local cost assessments for any Agency-financed programmes in the least developed countries have been instituted.

42. Experience shows that it is usually necessary to contact 8-10 potential candidates to determine their interest in and availability for a vacant expert post. The curricula vitae of 3-4 of these candidates are subjected to a technical evaluation as part of the process of selecting the specialists best qualified for the work to be done, and 1-2 candidates are proposed to the recipient Government; in most cases the Government accepts the Agency's initial choice. It is unfortunate, however, that this clearance procedure is so time-consuming. It requires 2-3 months in half of the cases and 4-6 months or longer for the rest, often resulting in the loss of an otherwise acceptable candidate, who is no longer available, and the need to find new candidates who have to be submitted for clearance; in such cases the delay in project implementation can amount to as much as two years, and in a few instances it can be even longer. Over the 15 years of expert recruitment by the Agency, thousands of dossiers of potential experts have been accumulated; during 1972 letters were sent to 1500 of these experts, asking for information to bring up to date that already on the file and to determine candidates' continued availability for expert assignments. As a result, about 1100 names were taken off the active recruitment roster, which now consists of about 2000 names. With regard to the manner in which the names of expert candidates become known to the recruitment office, it is interesting to note that 20% are nominated by Governments, 20% apply directly, 10% are specifically requested by recipient countries and 50% are suggested by the Agency's Headquarters staff.

43. In addition to placing advertisements in technical journals and soliciting names of suitable candidates from scientists visiting Headquarters, the Agency's monthly expert recruitment status report is distributed to more than 260 official sources of expert candidates in order to ensure adequate distribution of information concerning vacant expert posts. Although this system functions satisfactorily for 90-95% of vacant posts, it continues to be difficult to obtain a sufficient number of experts for assignments of one year or longer and extremely difficult to find qualified candidates for assignments in a number of highly sophisticated specialized subjects. In this connection it is hoped that the more advanced Member States will intensify their efforts to make an adequate number of qualified candidates available for expert posts that are difficult to fill and thus increase their contribution to the Agency's programme of technical co-operation.

FIGURE 1

RESOURCES AVAILABLE FOR
AGENCY TECHNICAL ASSISTANCE PROGRAMMES: 1963-1972
(in thousands of dollars)



	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Agency monetary	1230	1115	1200	1263	1380	1348	1587	1749	2214	2652
Assistance in kind	484	619	511	520	567	578	654	988	1397	954
UNDP	1014	1240	1317	1462	1431	1422	981	1513	1775	2590
TOTAL	2728	2974	3028	3245	3378	3348	3222	4250	5386	6196

Agency monetary Assistance in kind UNDP

Part II. ANALYSIS OF THE ASSISTANCE PROVIDED

A. AVAILABLE RESOURCES

1. General

44. The resources available to the Agency in 1972 for the provision of technical assistance came to $6 196 000 (see Fig. 1 and Table 1), which is 15% higher than the figure for 1971 ($5 386 000) and is made up as follows:

(a) UNDP, $2 590 000 in cash: $1 163 000 for small-scale projects and $1 427 000 for large-scale projects;

(b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, $2 652 000; 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 $954 000. Of this total, $948 000 was made available in respect of the regular programme and $6000 for UNDP projects.

2. UNDP

45. The funds allocated for carrying out the 1972 UNDP field programme included $74 000 for intercountry projects and $2 516 000 for country programme projects; the funds for large-scale projects are included in the latter amount.

3. Agency's regular programme

46. As at 31 December 1972, the pledges of voluntary contributions to the General Fund for 1972 had exceeded 83% of the target figure of $3 million, as compared with about 86% of the $2.5 million target figure in respect of 1971. The payment by Member States of current and prior years' pledges was reflected in the income to Operating Fund II ($2 652 000, the largest amount received in any year to date, as compared with $2 214 000 in 1971), from which the regular programme is financed.

4. Gifts in kind

47. The estimated value of assistance in kind made available in 1972 was $954 000, which is almost one third less than the figure of about $1 397 000 for 1971. This drop is attributable to substantial decreases in the value of cost-free expert services (from $88 400 to $44 200), equipment grants (from $309 200 to $236 800) and fellowships (from $999 000 to $672 700 consisting of Type II fellowship and training course stipends). This situation was predicted in last year's report, in which it was foreseen that the assistance in kind likely to be made available in respect of the 1972 programme from the three Member States that provided 75% of such assistance under the 1971 programme would probably not reach $700 000 [9]; the assistance in kind actually made available by these three States in support of the 1972 programme has been estimated at $585 000, or 61% of the total resources in kind for that year. This clearly demonstrates the dependence of the Agency's technical assistance programmes on the generosity of a few Member States, as well as the desirability of receiving more assistance in kind in support of the Agency's programmes on a regular basis, from more of the technically advanced Member States.

5. Funds-in-trust

48. No assistance was provided by the Agency under funds-in-trust arrangements in 1972.

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[9] GC(XVI)/INF/137, para. 23.

6. Use of resources

49. The Agency provided more technical assistance in 1972 than in any previous year. The total value of the assistance, $5 498 600, represents an increase of $553 500 or about 11% over 1971. The totals in respect of the regular programme and the UNDP large-scale projects are the highest on record for a single year. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1972 amounted to $3 019 900, consisting of $445 500 for expert services, $1 358 800 for equipment and supplies and $1 215 600 for fellowships. The type and estimated value of the assistance in kind made available to the Agency in 1972 is given - by donor - in Annex II, which also includes information on possible assistance to projects not included in the 1972 regular programme owing to lack of funds.

50. As in earlier years, regular programme and UNDP expenditures and unliquidated obligations at year's end exceeded the cash resources in respect of 1972 projects financed under these programmes, due to the fact that the former totals include expenditures and obligations met from funds carried over from 1971 and prior years. Also of interest is the fact that the value of the technical assistance programmes being implemented by the Agency - based on the sum of expenditures during the year and the total of unliquidated obligations and assistance in kind outstanding at the year's end - passed the $8 million mark for the first time in the Agency's history in 1971, and exceeded the $8.5 million mark in 1972.

B. DISTRIBUTION OF ASSISTANCE

1. By field of activity

51. A 1971:1972 comparison is given below of the amount of assistance provided in what were the top five fields of activity in 1972. Numerical data for all ten fields of activity are given in Figs 2A, 3A and 4A (which also include comparable data for 1971), in Fig. 5A and Table 5.

Assistance by field of activity and type: 1971 and 1972
(in thousands of dollars)

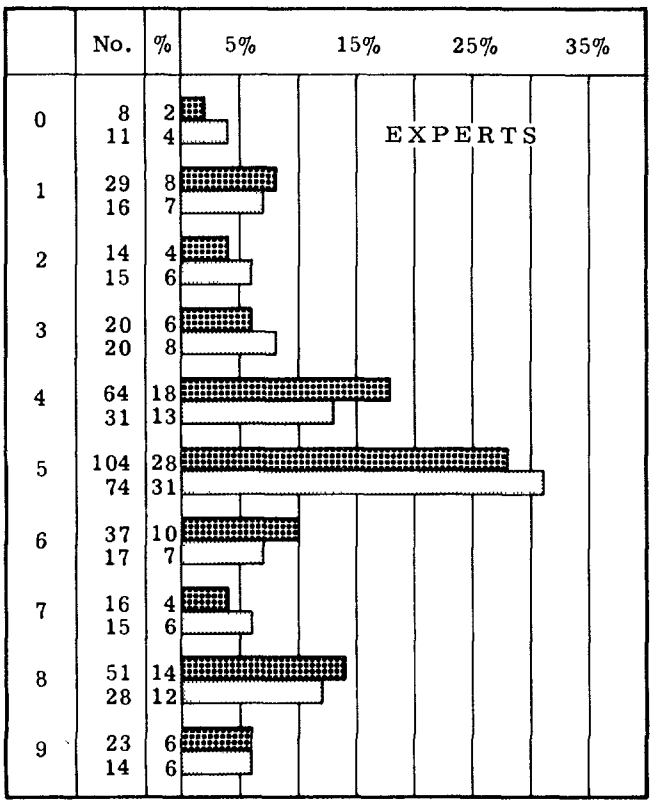
Field	Year	Experts	Equipment	Fellowships	Share of total programme	
		$	$	$	$	%
Application of isotopes and radiation in agriculture	1971	516.7	595.6	355.5	1467.8	29.7
	1972	530.9	512.1	392.7	1435.7	26.1
Nuclear engineering and technology	1971	313.7	194.2	276.6	684.5	13.8
	1972	203.8	284.7	370.2	858.7	15.6
Application of isotopes and radiation in medicine	1971	131.9	120.9	170.2	423.0	8.6
	1972	178.7	210.5	184.8	574.0	10.5
Other fields of application of isotopes and radiation	1971	147.5	141.4	132.1	421.0	8.5
	1972	173.2	261.2	83.4	517.8	9.4
Prospecting, mining and processing of nuclear materials	1971	227.7	207.2	62.0	496.9	10.1
	1972	297.6	177.6	34.7	509.9	9.3
Total	1971	1337.5	1159.3	996.4	3493.2	70.7
	1972	1384.2	1446.1	1065.8	3896.1	70.9
Total assistance	1971	1789.0	1525.0	1631.1	4945.1	100.0
	1972	1840.2	1922.1	1736.3	5498.6	100.0

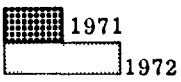
FIGURE 2A

DISTRIBUTION OF EXPERT SERVICES BY FIELD OF ACTIVITY AND REGION: 1971 and 1972

Field	Year	Africa		Asia and the Far East		Europe		Latin America		Middle East		Inter-regional		TOTAL		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
0 - General atomic energy development	1971	4	12	4	5	-	-	-	-	-	-	-	-	8	17	2.2	2.1
	1972	3	13	6	5	-	-	2	7	-	-	-	-	11	25	4.6	3.2
1 - Nuclear physics	1971	1	7	6	33	7	11	6	26	1	3	8	6	29	86	7.9	10.5
	1972	1	1	6	19	8	20	1	4	-	-	-	-	16	44	6.6	5.6
2 - Nuclear chemistry	1971	1	7	5	20	6	16	2	3	-	-	-	-	14	46	3.8	5.6
	1972	2	11	4	32	6	7	3	12	1	1	-	-	15	63	6.2	8.0
3 - Prospecting, mining and processing of nuclear materials	1971	4	19	3	17	4	20	9	43	-	-	-	-	20	99	5.5	12.1
	1972	4	20	4	29	5	52	7	30	-	-	-	-	20	131	8.3	16.5
4 - Nuclear engineering and technology	1971	6	40	24	34	-	-	15	56	2	4	17	18	64	152	17.5	18.5
	1972	3	15	10	35	3	2	7	20	2	4	6	12	31	88	12.9	11.1
5 - Application of isotopes and radiation in agriculture	1971	14	85	33	83	10	14	15	19	4	9	28	9	104	219	28.4	26.7
	1972	13	70	20	82	10	19	6	22	2	20	23	8	74	221	30.7	27.9
6 - Application of isotopes and radiation in medicine	1971	1	3	4	12	6	10	7	20	5	18	14	3	37	66	10.1	8.0
	1972	2	13	4	14	5	14	3	16	3	13	-	-	17	70	7.1	8.8
7 - Application of isotopes and radiation in biology	1971	1	12	-	-	10	17	5	8	-	-	-	-	16	37	4.4	4.5
	1972	2	20	6	4	1	1	2	10	-	-	4	1	15	36	6.2	4.5
8 - Other fields of application of isotopes and radiation	1971	10	16	20	20	5	5	11	21	-	-	5	3	51	65	13.9	7.9
	1972	3	15	5	21	5	4	15	43	-	-	-	-	28	83	11.6	10.5
9 - Safety in nuclear energy	1971	2	6	13	7	2	2	6	19	-	-	-	-	23	34	6.3	4.1
	1972	1	9	2	3	1	3	7	13	-	-	3	3	14	31	5.8	3.9
GRAND TOTAL	1971	44	207	112	231	50	95	76	215	12	34	72	39	366	821	100.0	100.0
	1972	33	187	67	244	44	122	53	177	8	38	36	24	241	792	100.0	100.0

(1) Number of expert assignments. (2) Number of man-months.

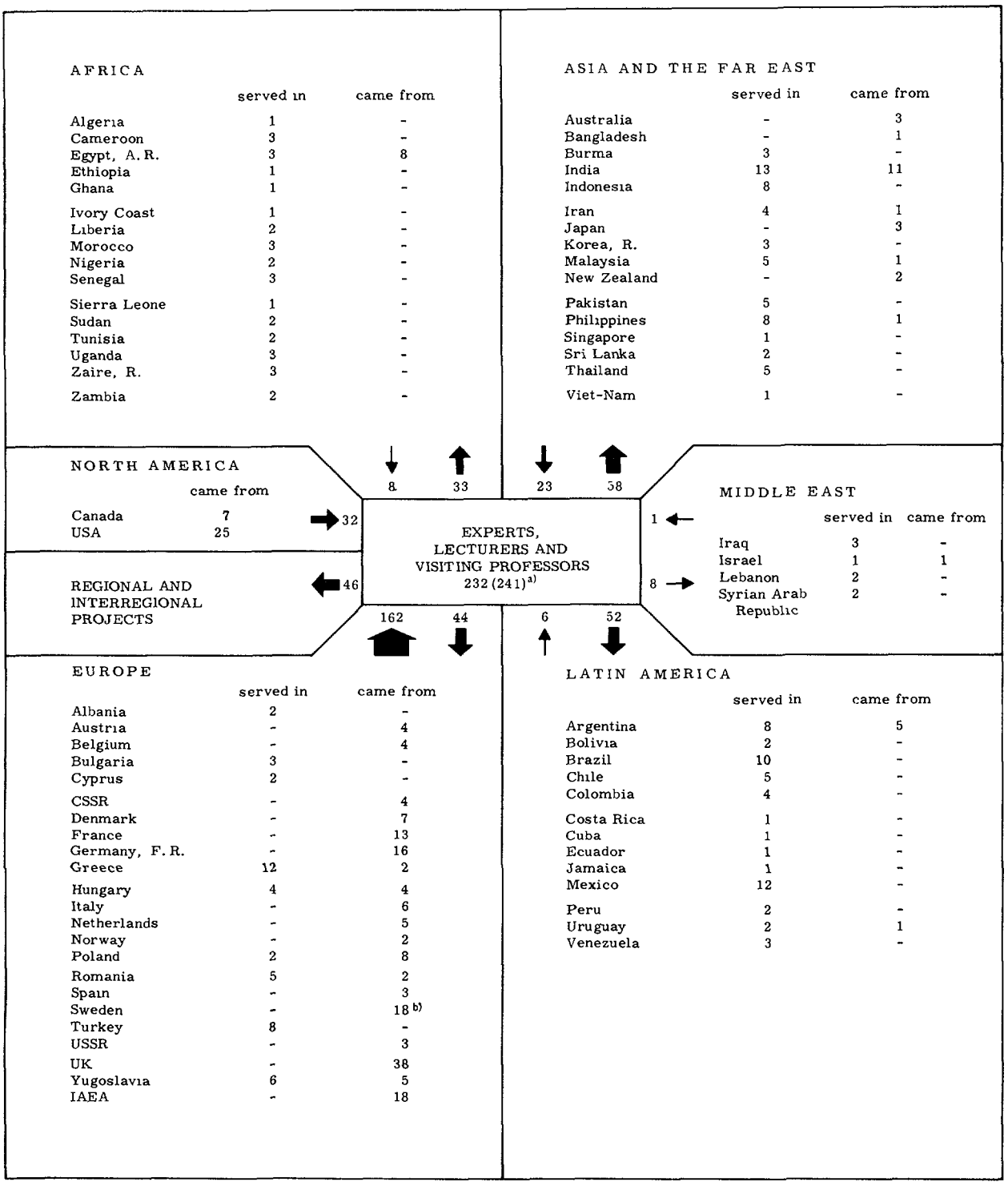




Note:
The figures in the second and third columns of the chart indicate the number of expert assignments and the corresponding percentage share, by field of activity, of total expert services provided.

FIGURE 2B

DISTRIBUTION OF EXPERT SERVICES BY REGION: 1972



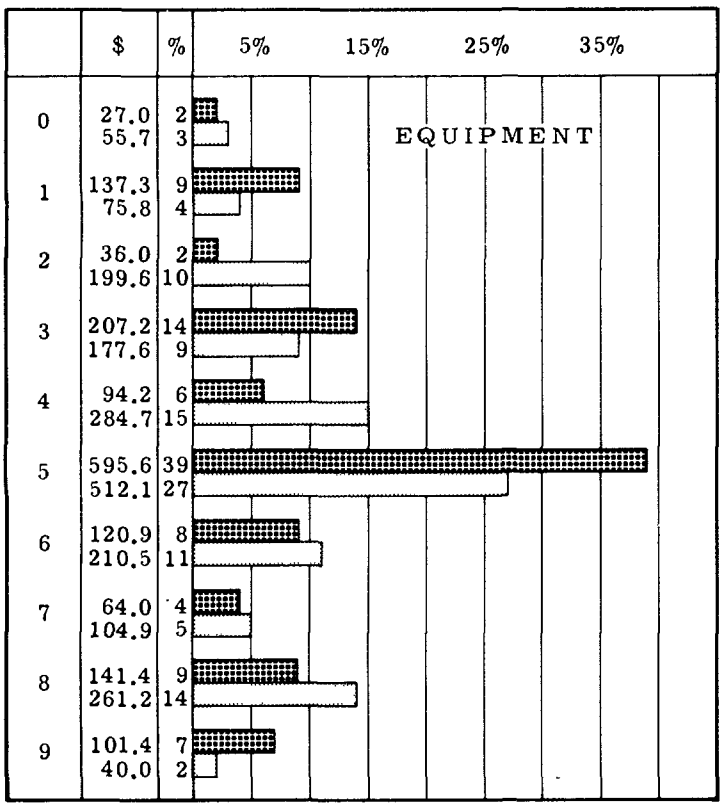
a) The difference in the number of assignments (241) and the actual number of experts (232) is due to the fact that five experts served in two and two in three different countries.

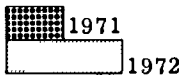
b) Includes ten lecturers for the SIDA-financed training course as follows: from Finland, one; Germany, F.R., three; Sweden, one; United Kingdom, three; United States, one; Yugoslavia, one.

FIGURE 3A

DISTRIBUTION OF EQUIPMENT BY FIELD OF ACTIVITY AND REGION: 1971 and 1972
(in thousands of dollars)

Field	Year	Africa	Asia and the Far East	Europe	Latin America	Middle East	Inter-regional	TOTAL	Percentage of total
0 - General atomic energy development	1971	13.5	13.5	-	-	-	-	27.0	1.8
	1972	41.9	13.8	-	-	-	-	55.7	2.9
1 - Nuclear physics	1971	1.0	54.3	27.6	48.3	6.1	-	137.3	9.0
	1972	18.9	12.5	15.1	29.1	0.2	-	75.8	3.9
2 - Nuclear chemistry	1971	-	21.9	4.4	2.1	7.6	-	36.0	2.4
	1972	29.2	59.6	13.7	73.1	24.0	-	199.6	10.4
3 - Prospecting, mining and processing of nuclear materials	1971	10.9	134.7	40.7	11.1	-	9.8	207.2	13.6
	1972	39.0	51.0	37.2	50.4	-	-	177.6	9.2
4 - Nuclear engineering and technology	1971	24.3	5.8	12.6	47.1	0.9	3.5	94.2	6.2
	1972	49.8	126.8	47.5	7.7	32.0	20.9	284.7	14.8
5 - Application of isotopes and radiation in agriculture	1971	105.0	387.1	50.5	35.5	11.3	6.2	595.6	39.0
	1972	72.5	247.1	112.4	44.5	21.9	13.7	512.1	26.6
6 - Application of isotopes and radiation in medicine	1971	25.0	36.3	32.1	11.2	15.0	1.3	120.9	7.9
	1972	11.6	126.9	10.6	38.4	16.4	6.6	210.5	11.0
7 - Application of isotopes and radiation in biology	1971	25.4	2.6	32.2	3.8	-	-	64.0	4.2
	1972	6.5	23.3	60.4	14.7	-	-	104.9	5.5
8 - Other fields of application of isotopes and radiation	1971	15.5	52.9	28.3	44.7	-	-	141.4	9.3
	1972	4.2	170.9	3.3	58.6	24.1	0.1	261.2	13.6
9 - Safety in nuclear energy	1971	25.7	33.2	22.9	19.6	-	-	101.4	6.6
	1972	1.3	12.3	1.7	24.7	-	-	40.0	2.1
GRAND TOTAL	1971	246.3	742.3	251.3	223.4	40.9	20.8	1525.0	100.0
	1972	274.9	844.2	301.9	341.2	118.6	41.3	1922.1	100.0





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: 1972
(in thousands of dollars)

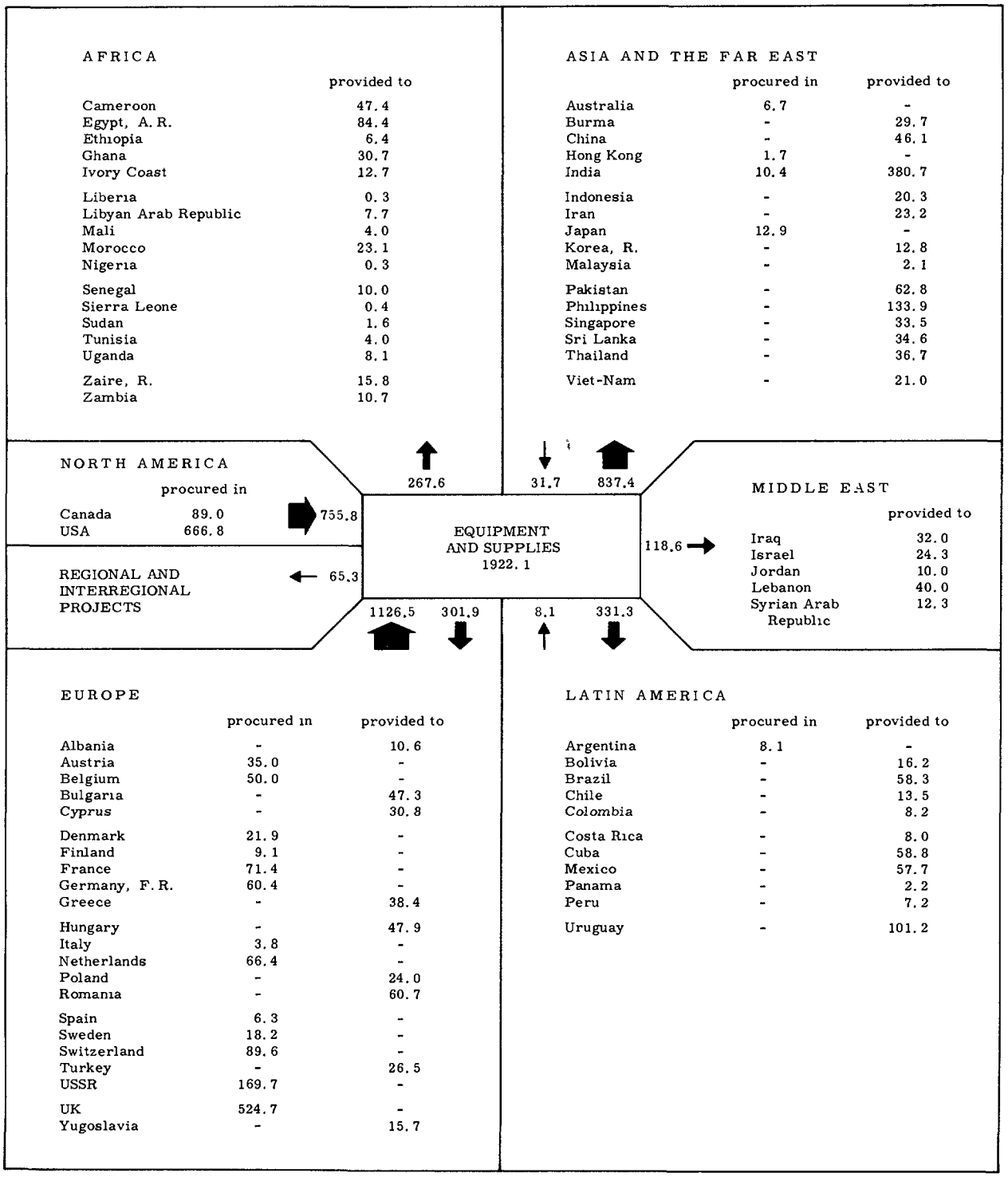
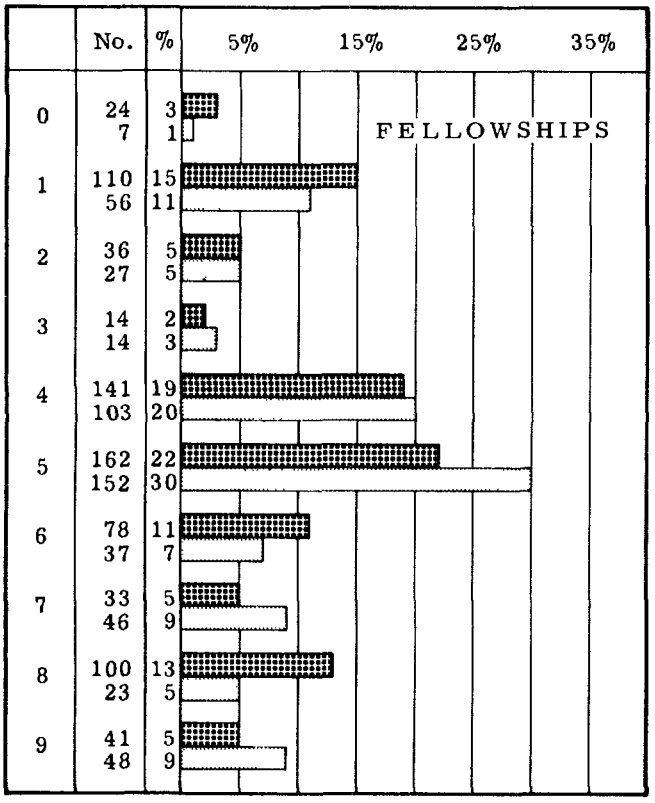


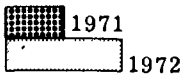
FIGURE 4A

DISTRIBUTION OF FELLOWSHIP AWARDS BY FIELD OF ACTIVITY AND REGION: 1971 and 1972

Field	Year	Africa		Asia and the Far East		Europe		Latin America		Middle East		Inter-regional		TOTAL		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
0 - General atomic energy development	1971	8	79	11	18	2	8	3	16	-	-	-	-	24	121	3.2	2.8
	1972	3	28	4	13	-	-	-	-	-	-	-	-	7	41	1.4	1.3
1 - Nuclear physics	1971	10	112	9	105	40	408	10	101	3	30	38	56	110	812	14.9	19.2
	1972	8	68	10	88	25	249	10	85	3	35	-	-	56	525	10.9	16.3
2 - Nuclear chemistry	1971	6	69	7	78	11	70	7	68	5	57	-	-	36	342	4.9	8.1
	1972	3	20	11	81	9	59	3	38	1	12	-	-	27	210	5.3	6.5
3 - Prospecting, mining and processing of nuclear materials	1971	2	18	5	32	-	-	7	55	-	-	-	-	14	105	1.9	2.5
	1972	1	6	5	45	1	12	2	15	5	42	-	-	14	120	2.7	3.7
4 - Nuclear engineering and technology	1971	9	74	43	241	43	439	11	115	9	79	26	50	141	998	19.1	23.5
	1972	5	50	28	259	30	238	23	238	3	23	14	44	103	852	20.1	26.5
5 - Application of isotopes and radiation in agriculture	1971	12	87	27	249	3	34	15	47	10	98	95	133	162	648	21.9	15.3
	1972	10	73	24	227	10	74	7	71	3	30	98	117	152	592	29.6	18.4
6 - Application of isotopes and radiation in medicine	1971	8	73	10	111	9	98	8	87	9	90	34	14	78	473	10.6	11.2
	1972	5	42	12	107	11	86	6	66	3	24	-	-	37	325	7.2	10.1
7 - Application of isotopes and radiation in biology	1971	5	55	7	75	12	100	8	15	1	12	-	-	33	257	4.5	6.1
	1972	1	5	19	74	8	84	-	-	1	12	17	15	46	190	9.0	5.9
8 - Other fields of application of isotopes and radiation	1971	32	87	36	74	8	80	2	24	4	42	18	16	100	323	13.5	7.6
	1972	2	15	2	11	8	83	8	56	3	17	-	-	23	182	4.5	5.6
9 - Safety in nuclear energy	1971	2	17	33	85	4	43	-	-	2	13	-	-	41	158	5.5	3.7
	1972	3	28	4	44	9	55	2	18	-	-	30	39	48	184	9.3	5.7
GRAND TOTAL	1971	94	671	188	1068	132	1280	71	528	43	421	211	269	739	4237	100.0	100.0
	1972	41	335	119	949	111	940	61	587	22	195	159	215	513	3221	100.0	100.0

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

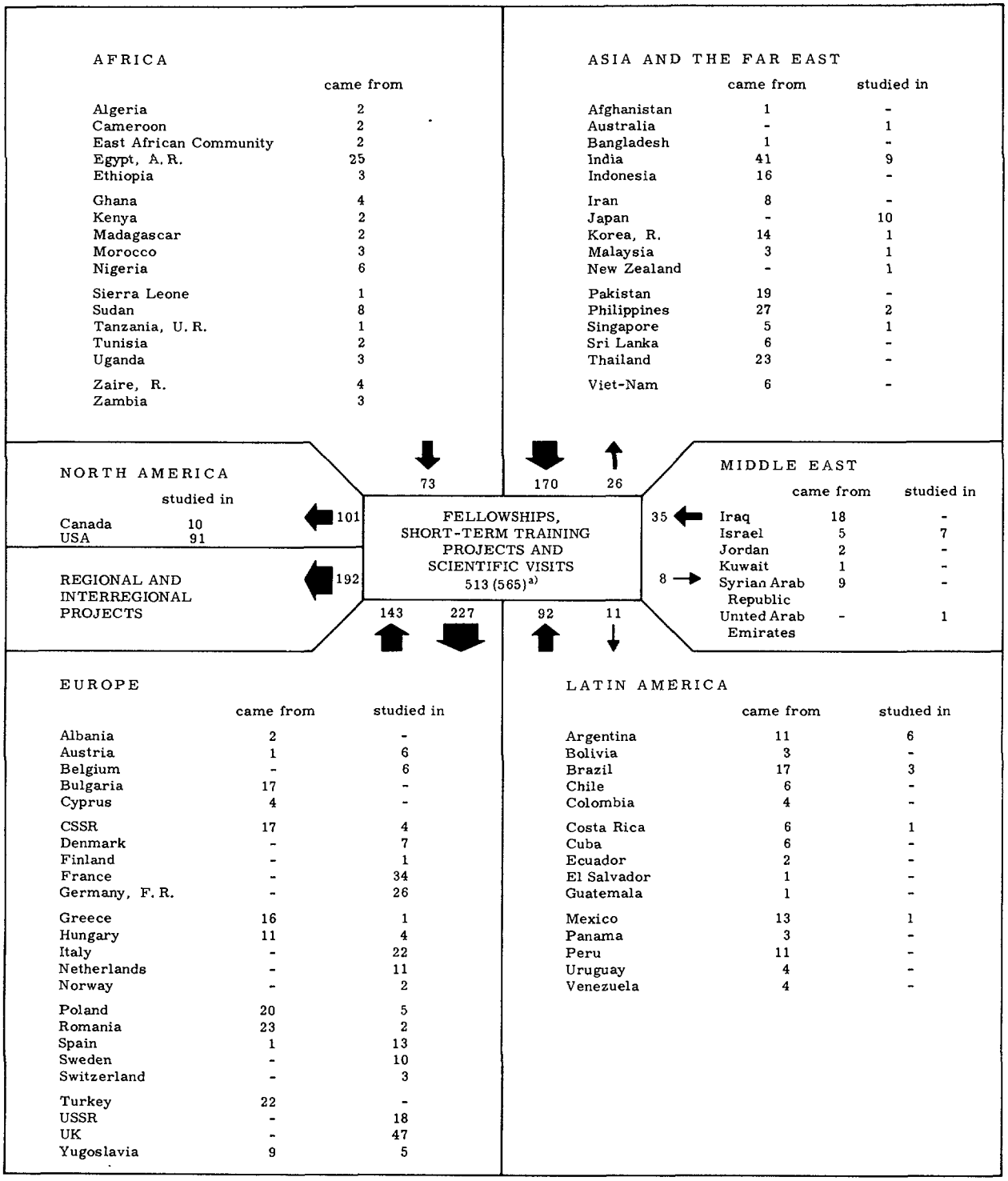




Note:
The figures in the second and third columns of the chart indicate the number of fellowship awards and the corresponding percentage share, by field of activity, of the total number of fellowships awarded.

FIGURE 4B

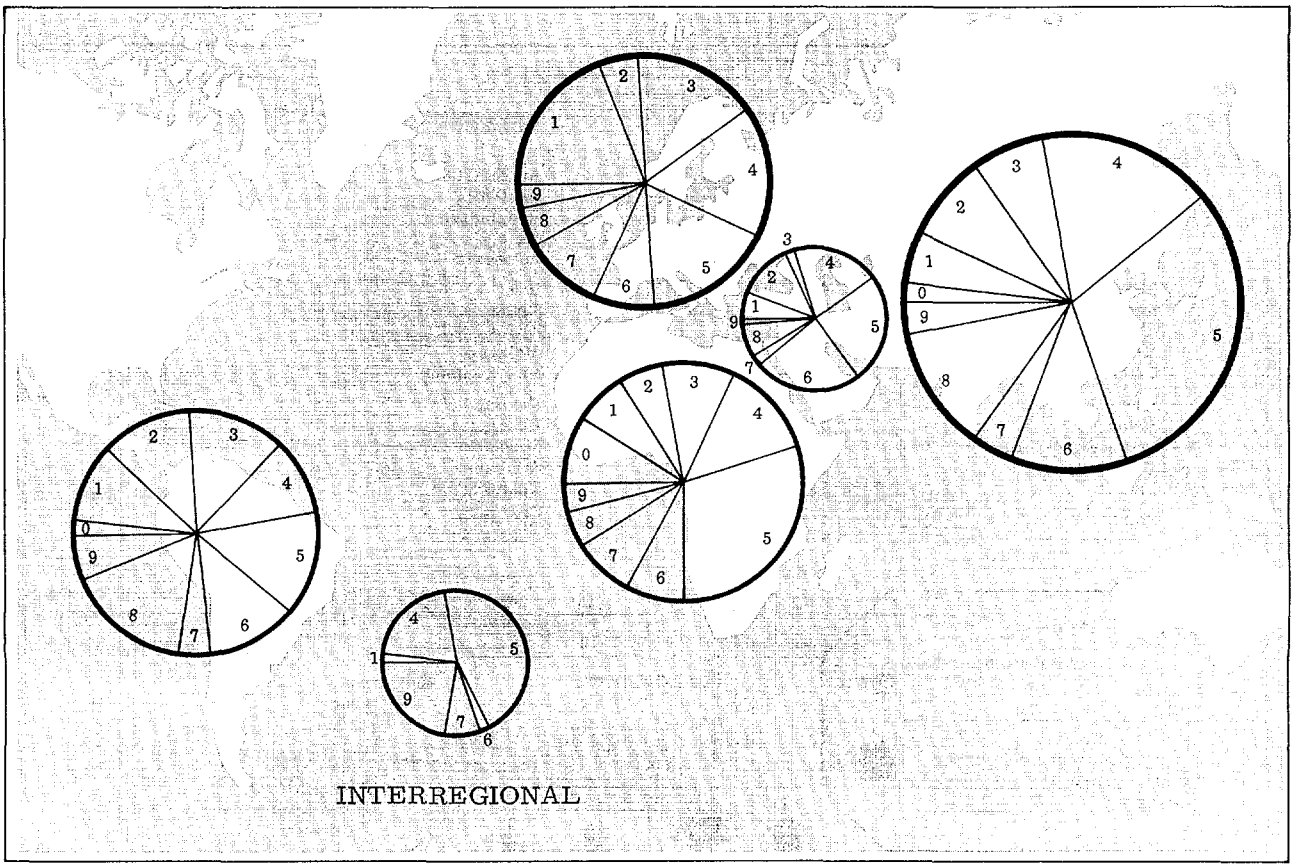
DISTRIBUTION OF FELLOWSHIP AWARDS BY REGION: 1972



a) The difference between the number of awards (513) and the number of places of study (565) is due to the fact that 12 fellows studied in two, two in three and one in four different countries, whereas one holder of an award for scientific visits went to two, six to three, five to four and one to six different countries.

FIGURE 5A

DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD OF ACTIVITY AND REGION: 1972[a)]



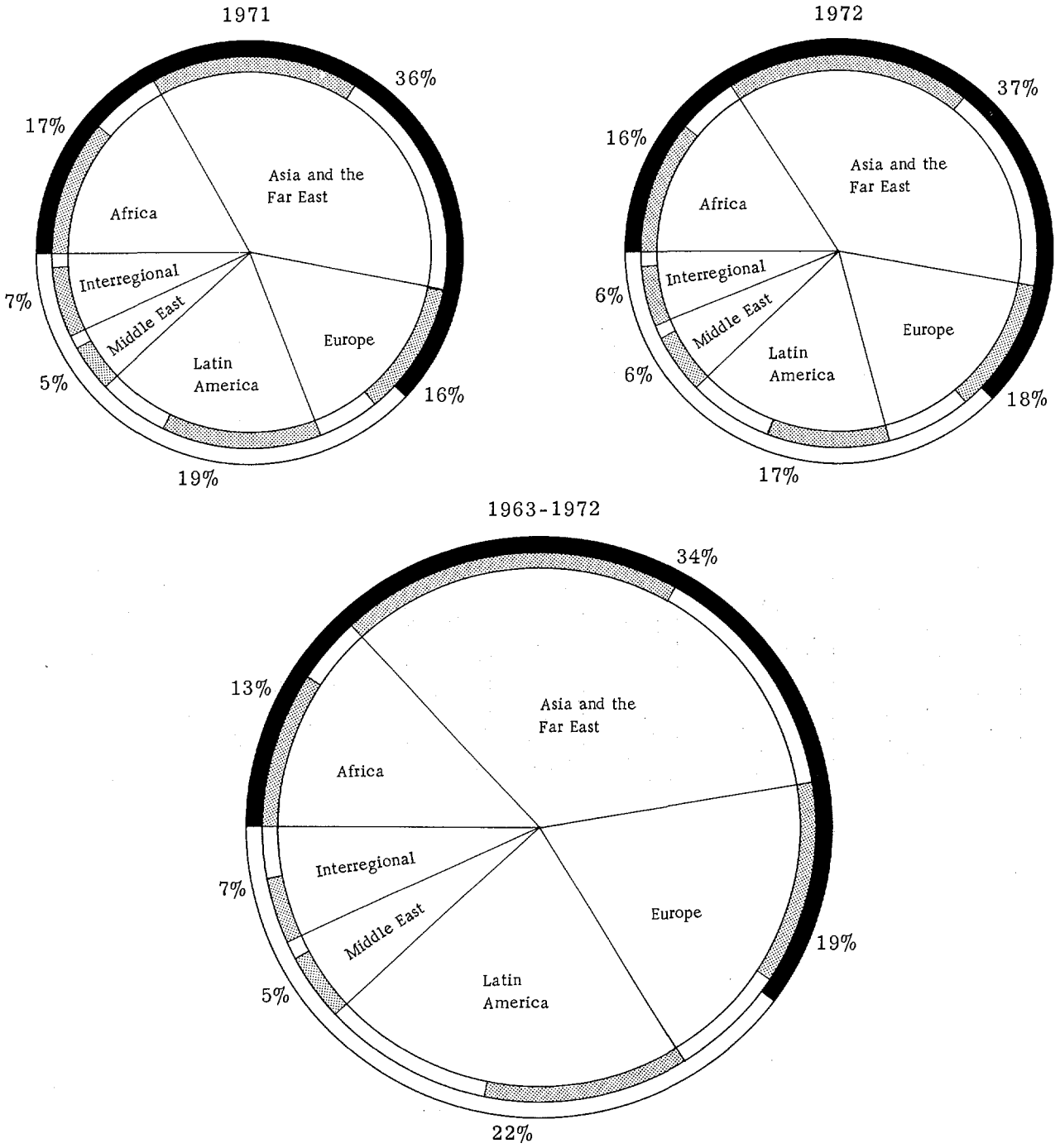
SUMMARY

Field	Africa	Asia and the Far East	Europe	Latin America	Middle East	Inter-regional
	%	%	%	%	%	%
0 - General atomic energy development	9	2	-	2	-	-
1 - Nuclear physics	7	5	19	10	6	2
2 - Nuclear chemistry	6	8	5	12	12	-
3 - Prospecting, mining and processing of nuclear materials	10	7	16	13	2	-
4 - Nuclear engineering and technology	13	17	17	10	20	20
5 - Application of isotopes and radiation in agriculture	30	31	17	14	25	46
6 - Application of isotopes and radiation in medicine	8	11	8	12	22	2
7 - Application of isotopes and radiation in biology	8	4	10	4	2	8
8 - Other fields of application of isotopes and radiation	5	12	5	17	10	-
9 - Safety in nuclear energy	4	3	3	6	1	22
	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
(1971, 1972 and 1963-1972)

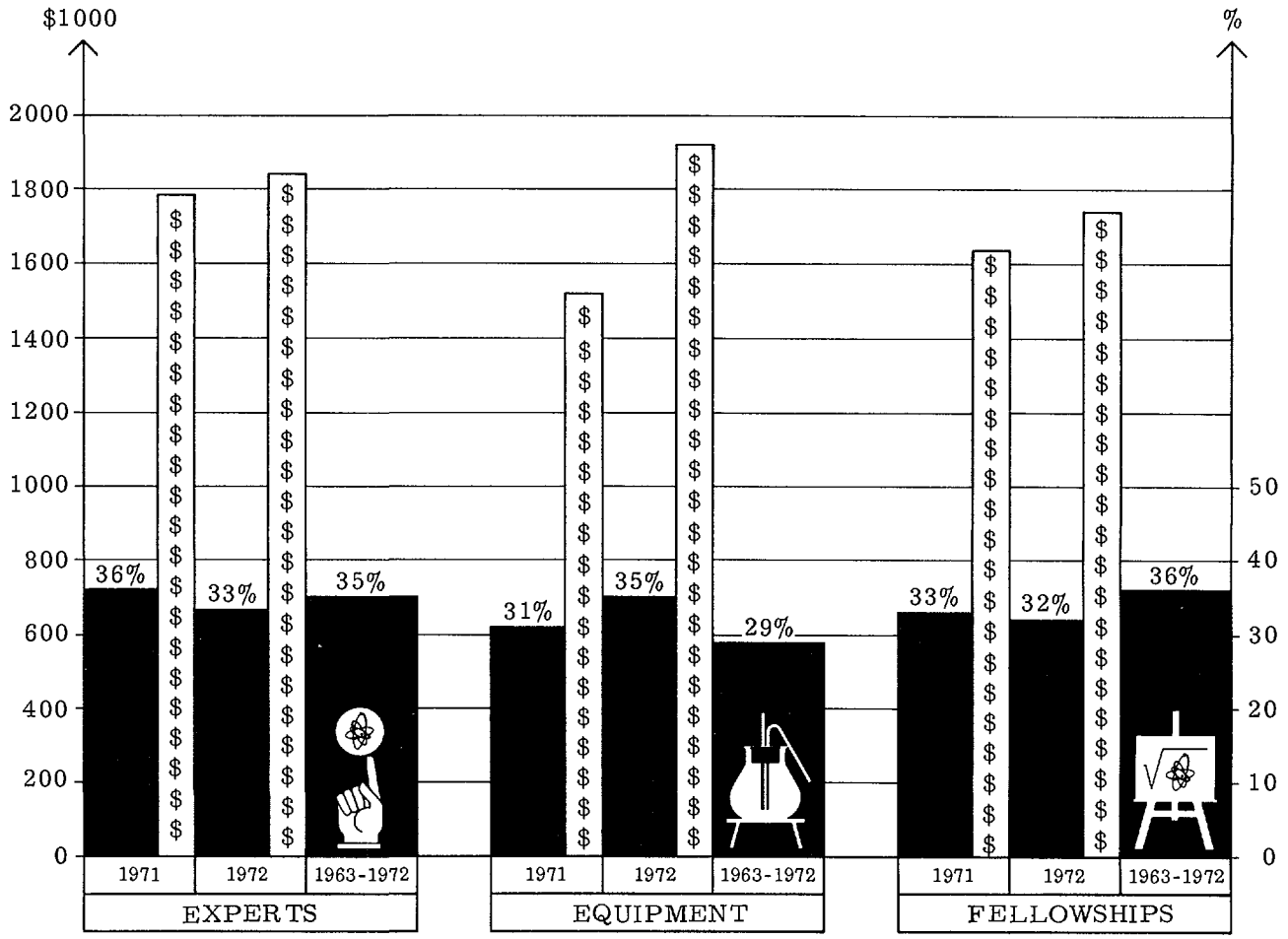


LEGEND (distribution of technical assistance by source):

INNER RING (regional distribution)	OUTER RING (overall distribution)	1971	1972	1963-1972
Regular programme	Regular programme	62.0%	62.2%	60.3%
UNDP	UNDP	38.0%	37.8%	39.7%

FIGURE 6

DISTRIBUTION OF TECHNICAL ASSISTANCE BY TYPE OF ASSISTANCE
(1971, 1972 and 1963-1972)



TYPE	1971		1972		1963-1972	
	%	$1000	%	$1000	%	$1000
EXPERTS	36	1789.0	33	1840.2	35	12423.5
EQUIPMENT	31	1525.0	35	1922.1	29	10041.3
FELLOWSHIPS	33	1631.1	32	1736.3	36	12634.8
TOTAL	100	4945.1	100	5498.6	100	35099.6

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

2. By region and country

52. Detailed information on the distribution of technical assistance by region is given in tabular form in Figs 2A, 3A and 4A and summarized in Figs 5A and 5B. More countries in Africa - namely, 21 - received Agency assistance in 1972 than in any other region; 16 Member States in Latin America received country programme assistance from the Agency in 1972, followed by the regions of Asia and the Far East, Europe and the Middle East with 14, 13 and 5 country programme recipients respectively. Two additional countries - one in Asia and the Far East and one in the Middle East - participated in the Agency's programme of intercountry short-term training projects.

53. In 1972, 71 countries and one regional organization received technical assistance from the Agency, as compared with 73 countries and one regional organization in 1971. Including those which acted as hosts for short-term training projects and scientific visits, 22 countries both received and provided assistance in 1972 (36 in 1971). As in 1971, 19 countries provided but did not receive technical assistance in 1972, and 49 countries were recipients only (37 in 1971). Thus, 90 countries (92 in 1971) participated in the Agency's technical assistance programme in 1972. 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

54. As shown in Fig. 6, the distribution of technical assistance in 1971, 1972 and over the period 1963-1972 by type, was as follows:

Period	Experts	Equipment	Fellowships
1971	36%	31%	33%
1972	33%	35%	32%
1963-1972	35%	29%	36%

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 available resources devoted to equipment was 23% over the ten-year period 1960-1969, 26% over the period 1962-1971 and has now reached the 29% mark.

(a) Experts, lecturers and visiting professors

55. In 1972, 232 experts, lecturers and visiting professors from 32 countries served a total of 792 man-months at a cost of $1 840 200; the comparable data for 1971 were: 345 experts, lecturers and visiting professors from 41 countries provided 821 man-months of assistance at a cost of $1 789 000. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1972 totalled $445 500 for expert services. Five experts each served in two countries, two experts each served in three countries, and 179 experts were assigned to one country only. A total of 54 countries (58 in 1971) were provided with country programme experts and visiting professors, and an additional 46 experts and lecturers (127 in 1971) assisted 11 intercountry projects (17 partly cost-free and 11 cost-free experts and lecturers were provided, as compared with 73 partly cost-free and 22 cost-free experts and lecturers in 1971). The sharp decrease in the number of experts serving in 1972 is attributable almost exclusively to the greatly reduced number of intercountry projects carried out by the Agency in 1972, for which 87 fewer experts and lecturers were required than in 1971. Experts' final reports which became available in 1972 are listed in Annex V.

(b) Equipment and supplies

56. Including the value of grants of equipment delivered during 1972, 54 countries and 20 intercountry projects (52 and 20 respectively, in 1971) were provided with equipment and

supplies to a value of $1 922 100, which represents an increase of 26% over the amount of $1 525 000 provided in 1971, and is the largest amount of equipment provided by the Agency in any one year. An additional amount of equipment and supplies valued at $1 358 800 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 1963-1972, it can be seen that the value of the equipment provided in 1972 was more than twice greater than ten years earlier.

57. 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 1972 those items were procured in 20 countries (in 1971, in 21 countries), as shown in Fig. 3B, which also includes financial data in respect of equipment grants.

58. The problems associated with equipment procurement and maintenance have been explained in detail in earlier reports, including last year's report [10], but have not yet been fully resolved. The need to make the best possible use of the available currencies - which often involves the acceptance of delivery delays of up to four years between the date of order and the time the equipment arrives at the project location - and the need to follow the established purchasing practice of obtaining the least expensive but most appropriate equipment for the task to be performed (while ensuring that the equipment is compatible with the existing equipment) complicate to a considerable extent the Agency's attempt to synchronize the timing of expert assignments with equipment deliveries. On the Governments' side, the need to provide more detailed information about the work to be undertaken, for which the requested equipment is required, and more accurate equipment specifications, continues to be a problem, as do the related questions of equipment standardization, maintenance and the stocking of spare parts. Where an equipment allocation permits, the Agency requests the supplier to include the most commonly required spare parts in the equipment shipment. This practice has not, however, always produced satisfactory results because spare parts in addition to those supplied are often required during the period of the project, that is, before title to the equipment has been transferred to the recipient Government.

59. A possible solution to this problem would be to discontinue the provision of spare parts with equipment shipments - with the exception, of course, of the spare parts automatically included by the supplier in his original equipment price quotation - and to procure, on a trial basis within the over-all limits of the equipment allocation in respect of a given project, essential spare parts during the time that the Agency is responsible for the equipment, that is, until title to the equipment has been transferred to the Government.

(c) Fellowships

60. A total of 513 candidates from 61 countries and a regional organization received fellowship awards under the training programme in 1972 (see Fig. 4B and Tables 3 and 6) as against 739 candidates from 66 countries and a regional organization in 1971. The number of man-months of training awarded was 3221 in 1972 as against 4237 in 1971. The sizable decrease in the number of fellowship award holders and in the number of man-months of training in 1972 was due mainly to a 50% cut in the intercountry programme of training courses and a reduction of one third in the Type I awards for individual study financed from Agency funds.

61. Because of the large number of award holders under prior years' programmes who studied in 1972, the value of the training provided by the Agency in 1972 is the highest on record for any one year, namely, $1 736 300, as compared with $1 631 100 in 1971. The 1972 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 1972, amounting to $1 215 600. This amount is more than $200 000 lower than the combined total of these two items at the end of 1971 and holds promise of a training programme amounting to about $1 500 000 in 1973.

[10] Ibid., paras 35-37.

62. A comparison of the nominations and awards for country programme fellowships in 1971 and 1972 and of all technical assistance awards made during these two years is given below. The number of country programme awards fell by 15% and those for short-term training projects by about 50%.

Country programme awards	1971		1972	
Nominations received		508		475
Effective awards [11]				
Individual projects	354		293	
International projects	30	384	32	325
Percentage of nominations which led to effective awards		75.6%		68.4%
Intercountry programme awards				
Scientific visits	15		16	
Short-term training projects	340		172	
Total awards	739		513	

63. The decrease from 75.6% in 1971 to 68.4% in 1972 in the percentage of nominations which led to effective awards may appear, at first glance, to indicate that a significant deterioration in the qualifications of fellowship candidates had occurred. From the comparison given below, however, it will be seen that the lack of funds was the main reason why fewer awards were made in 1972 and that the qualifications of candidates in 1972 were actually better than in 1971, reflecting greater care on the part of the recipient countries' nominating authorities in the selection of candidates to be proposed for Agency training awards.

Nominations not resulting in effective awards in 1971 and 1972

	Number		Share of total nominations received	
	1971	1972	1971	1972
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	57	30	11.2%	6.3%
Withdrawn on the initiative of the nominating Government (before or after award)	52	35	10.2%	7.4%
Not resulting in awards owing to the lack of funds or appropriate training openings	15	85	3.0%	17.9%
Total	124	150	24.4%	31.6%

[11] Total number of awards less withdrawals after award as at 31 December 1971 and 31 December 1972, respectively.

(d) Regional and interregional activities

64. In 1972, the Agency conducted 11 intercountry training projects in 13 different countries, in which there were 549 participants from 51 different countries and a regional organization. The cost of attendance of 172 participants from 48 countries and the regional organization was paid out of project funds (Agency resources in kind, under the regular programme and under UNDP); the cost of attendance of 377 participants, including 376 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 172 awards financed from Agency resources.

65. Eight of the 11 intercountry training projects related to the application of isotopes and radiation (six in agriculture and two in biology); in addition there was one project in the maintenance and repair of nuclear electronic equipment, one in neutron scattering, and one in radiological protection. Further details on the location, attendance, financing, etc. of these projects are given in Annex III.

(e) Follow-up mission

66. In 1972 three 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 $322 for each of the 18 countries visited.

C. UNDP LARGE-SCALE PROJECT ACTIVITIES

1. General

67. 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 a UNDP-financed large-scale project. Designed to make an early impact in the recipient country, the large-scale projects executed by the Agency are primarily of the pre-investment type or are for the demonstration of nuclear techniques and modern technology, or involve a combination of both of these. Projects for which pre-investment assistance is provided by 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 Agency-executed large-scale projects of this type are the nuclear research projects in agriculture in Brazil and India (now being implemented) and in Yugoslavia (completed at the end of 1966), and the non-destructive testing centre in Argentina. The increasing importance of these projects in the overall technical co-operation activities of the Agency can be seen from the following comparison: ten years ago the large-scale project assistance provided by the Agency totalled $60 200 or less than 2½% of the total assistance provided in 1963, as against $996 600 or 18% of the total assistance provided in 1972. Details are given below on the large-scale projects currently being executed by the Agency with a view to bringing up to date the information provided in last year's report [12].

2. Nuclear research in agriculture in India

68. Project operations are progressing satisfactorily at the Indian Agricultural Research Institute (IARI), the Bhabha Atomic Research Centre, the Indian Veterinary Research Institute and the National Dairy Research Institute, where virtually dozens of research

[12] GC(XVI)/INF/137, paras 44-60.

programmes are under way. The progress being made and the scale and diversity of activities at IARI are representative of the work being done at all four institutes; the newly commissioned nuclear research laboratory at IARI is increasing its staff to cope with newly initiated research programmes and the work transferred from provisional facilities. Numerous equipment items, such as an electron microscope, have been installed to extend IARI's research capability. IARI is also conducting training courses on the application of isotopes and radiation in agriculture for participants from other Indian agricultural research institutes and has added a post-graduate-level course on radiotracer techniques to its manifold activities.

3. Uranium exploration in Greece

69. The car-borne scintillometer survey was nearly finished and samples from about one quarter of the project area were subjected to geochemical analysis during 1972. The results obtained have been encouraging, and it is anticipated that a request will be submitted to UNDP at the conclusion of the current field season to authorize an expansion of activities under a second phase of the project.

4. Uranium exploration in Pakistan

70. Work on this project during 1972 consisted mainly of drilling operations begun in February, lasting through April, and resumed in October, which marked the start of the second field season. The Winkie drills provided by UNDP proved particularly effective in the type of terrain under investigation and were used extensively to drill to depths of about 100 feet. Deephole drilling involving the use of a truck-mounted rotary rig will be undertaken upon completion of access roads to the proposed drill sites. Difficulties in respect of access and the provision of adequate camp facilities, as well as the supply of spare parts for the drills, had been largely overcome by the end of the year. Exploration findings have been sufficiently encouraging to justify an extension of the duration of field operations, which has been requested by the Pakistan Government.

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

71. Satisfactory progress was achieved during 1972. The construction of the main building has been completed and the installation of the irradiation cell and conveyor components being supplied by the sub-contractor has been started. Notwithstanding a shipping strike in the United Kingdom, which caused some delay in component deliveries, there is every indication that the plant will be commissioned by early 1974, as scheduled. Even while construction proceeds, market surveys for the service to be provided by the plant are being conducted to ensure the timely linkage of the project with the medical products industry in the Bombay area. The first market survey indicates that the demand for the medical products sterilization service may well exceed the capacity of this first demonstration plant, which is expected to be the forerunner of other plants of this kind in India.

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

72. The Project Manager took up his duties in September 1972 and devoted his entire time to the completion of the project document - which outlines the work programme and the division of responsibilities between the Argentine Government, the Agency and UNDP - and to paving the way for the timely implementation of the project.

7. Nuclear research in agriculture in Brazil

73. This project became fully operational in September 1972, when the project document was signed by the representatives of the Government, the Agency and UNDP. The Project Manager had arrived in the field in April 1972. Additional project experts have been

appointed, equipment has been ordered and delivered and a number of fellowship awards has been made.

8. National nuclear energy centre in Chile

74. The status of field operations is similar to that in Argentina. The Project Manager began his assignment in August 1972, and the project document has still to be signed by the three parties concerned. One additional expert has been assigned and a fellowship award has been made as preparatory assistance.

9. Feasibility study for a nuclear power plant in the Philippines

75. This project, begun in 1972, is a follow-up to the UNDP-financed pre-investment study on power, including nuclear power, in Luzon which was conducted in 1964-66. Although, in the latter study, nuclear power was found to be competitive with alternative energy sources, the high initial capital costs and the foreign currency outlays involved - representing a problem for many developing countries which has still to be resolved - made it necessary to defer construction of a plant. Several important developments have taken place in the meantime, notable among them being the sharp rise in fuel oil prices following the conclusion of an agreement in Teheran among a number of oil-producing countries. As a consequence, the Philippine Government has given high priority to studies to determine once again the viability of a nuclear power plant project in Luzon. The project aims at examining and analysing alternative electric power expansion programmes based on nuclear and conventional power-generating units and at establishing the optimum size and timing of the construction and commissioning of a nuclear power plant which would be economic. Detailed cost estimates for nuclear and conventional power plants have been prepared and comparisons made with a view to determining their suitability for integration in the existing electricity grid; in making those estimates and comparisons, current value techniques were used. The study is expected to enable the Government to make firm decisions regarding infrastructure planning and development, the negotiation of loans and the calling for bids for nuclear and/or conventional power plants in 1973. The project, in which the bulk of the work was done by sub-contract, was initiated in March 1972 and completed in May 1973.

10. Development of nuclear technology in Romania

76. The Institute of Nuclear Technology in Romania will be expanded and strengthened and will work exclusively for the nuclear power industry in the country, where 1000 MW(e) of electricity generated from nuclear power is scheduled to be available in 1980; plans for a high annual rate of expansion of nuclear power after 1980 have also been made. Under the project, which was begun in 1972, a demonstration facility will be established to sinter uranium oxide pellets and develop appropriate fuel elements and reactor components, together with testing methods, as a first step towards building up a competent service organization for the country's nuclear power programme. Other studies related to the fuel cycle and optimization work, among other topics, will also be undertaken by the institute's staff.

D. EVALUATION OF TECHNICAL ASSISTANCE PROGRAMMES

1. General

77. The creation of an awareness of the need to carry out a crticial evaluation of the effectiveness of the technical assistance programme and of the processes required to do so has been the concern of all agencies in the United Nations system. The subject of evaluation has been considered in great detail in the "Study of the Capacity of the United Nations

Development System" [13] and other reports on multilateral aid, and all relevant recommendations have been taken into account by the Agency in its evaluation process [14].

78. It is generally accepted that there are four evaluation stages: project formulation, appraisal of requests, operational control and assessment of results. In project formulation, the Agency, in close co-operation with Governments, considers the requested assistance in the context of countries' overall economic and social development, based on the background information which must be provided at the time requests are submitted, for example, information on the purpose and scope of the proposed activity, as well as on the sectoral or national objectives which the assistance is expected to help achieve. Furthermore, the project is so designed, in collaboration with the Government, as to ensure that it is carried out under the direction of the most suitable ministry or institute, as experience has shown that unclear lines of authority render unlikely the timely follow-up of an expert's recommendations.

79. The appraisal of a request, carried out by the Secretariat in the light of the Government's economic and social development plans, includes making an assessment of the technical feasibility of the use of nuclear techniques. This review may occasionally require clarification of a request with the Government by correspondence, in meetings with its representatives or, exceptionally, by sending consultants or Headquarters staff to the requesting country. The appraisal process also includes the determination of the appropriate timing of the use of Government and Agency resources, and the collection of information relating to the counterpart support and facilities, including budgetary provision to be made available for the project.

80. Operational control - which has been defined as the activity or process by which proposed accomplishments, scheduled activities and budgeted expenditures are reviewed to determine whether progress has been satisfactory - is largely a monitoring process which is an integral part of project implementation and, in particular, of the reporting procedures laid down for Agency-provided experts. Operational control also involves financial reviews at intervals of approximately three months, to detect any delays in the scheduled arrival of experts or equipment, the award of fellowships and the provision by the Government of qualified counterparts. In addition, planning and supervisory missions, and visits by technical and management staff from Headquarters, help to ensure that the project is reviewed regularly to determine the extent to which it is fulfilling the stated aims of Government policy.

81. The project document drawn up for UNDP large-scale projects (those involving a UNDP contribution of more than $100 000) of long duration or technical complexity usually makes provision for a mid-term review to be carried out by representatives of UNDP, the executing agency and the recipient Government, whereas an end-of-project review by the same three parties is to be made for all large-scale projects. In the case of small-scale projects, such reviews are replaced by the routine reports of the experts and, in the case of regular programme activities, the annual formulation of the subsequent year's programme automatically calls for a review of previous and on-going projects in the country concerned. In addition to these reviews, the UNDP country programming procedure calls for a periodic review to determine whether the implementation of projects, for which funds have been approved, continues to be warranted, and a searching study is made of on-going projects to ensure that they enjoy Government priority, as reflected in budgetary counterpart allocations.

82. Assessment of results aims primarily at determining whether end-of-project and longer term objectives have been met or, in other words, the extent to which the project has made or is likely to make an impact on economic and social development. The making of this assessment is basically a Government obligation and, in the case of development programmes assisted in part by projects calling for the application of nuclear techniques, the

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[13] United Nations document DP/5.

[14] See document GC(XVI)/INF/137, paras 61 and 62.

assessment would necessarily take account of many factors outside the area specifically concerned with the peaceful uses of atomic energy. On the other hand, quantifiable results of the contribution made by Agency projects are seldom identifiable but many projects may be said to provide general indications of the extent of the development of physical and human resources, and some surveys and feasibility studies do identify the need and justification for capital investment in various sectors of the economy, as illustrated by the UNDP-financed nuclear power survey for the Philippines which was executed by the Agency.

83. The strengthening of training and research centres in the recipient countries helps to provide the skilled manpower and technological improvements needed to support development in various sectors. In the case of the Agency's technical fields of activity and the many research institutes supported, the impact of the Agency's assistance is usually of longer range significance, that is, it may not be noticeable until some time after assistance has ended. In the agricultural sector, for example, the Agency's assistance has encouraged the demonstration and adoption of new techniques to increase crop yields, through mutation breeding and more efficient use of water and fertilizer, and to improve livestock, through research on animal diseases and vaccines. The continued aid being given, for example, to the Zemun Centre in Yugoslavia and the assistance now being provided to the Indian Agricultural Research Institute, New Delhi, and to the Piracicaba Institute in Brazil, should ensure that the investment made by the Government and from multilateral sources bears fruit. Experience in assessing the effectiveness of the technical assistance provided to established research institutes reveals the need for a relatively concentrated period of assistance over some four to five years, followed by a tapering-off period of up to four years.

84. Evaluation is a continuing process, which is an integral part of the entire technical assistance system. Although evaluation is basically the responsibility of a recipient Government, the Agency is obliged to ensure that its assistance meets the requirements of national development plans and is provided in accordance with the intentions of the Governments that provide the funds; the Agency fulfils this obligation by following the planning and evaluation procedures outlined above and, when required, use is made of all the available expertise at Headquarters.

2. Transfer of skills

85. The basic purpose of the technical assistance programme is to transfer skills and knowledge and, where appropriate, to adapt modern methods and technology to conditions obtaining in the developing countries. Success or failure of a project depends on a variety of interrelated factors, namely, the competence and adaptability of the expert, the efficacy and timely arrival of the demonstration equipment, the presence of qualified Government counterpart personnel, the availability of supporting services and, in particular, of ancillary equipment items, laboratory facilities, etc.; failure to fulfil one or more of these requirements can jeopardize the achievement of project objectives. Generally speaking, the extent to which the Government provides appropriate counterpart personnel continues to improve, and there are now relatively few projects which have suffered from lack of trained supporting staff. However, in one country, additional support staff was made available in the form of an expert provided on a bilateral basis who was working in the same institute on a project, related to that assisted by the Agency, which consisted of determining the practicality of using radiation attenuated vaccines to combat endemic animal diseases. Additional counterpart financial provision - in the form of grants for minor equipment items - was provided through the expert's contacts with the authorities in his home country making overseas aid grants. In other instances, Agency experts have been able to obtain grants of ancillary equipment items as well as some financial support from their home institutes. These ad hoc injections of aid are valuable adjuncts to multilateral assistance and do much to increase the effectiveness of a project.

86. Apart from his technical expertise, the expert must understand and be adaptable to local conditions and, in many cases, be conversant with the susceptibilities of his counterparts. This is particularly true of experts engaged on assignments of one year or more

who may be called upon for advice on subjects not directly related to the assignment; a short-term expert is more often than not engaged in giving advice limited to his own narrow area of specialization. While both types of experts are in fact filling a gap which the Government cannot fill from its own resources, the approach to and the manner of carrying out the project may differ. In one country an expert spent a year in helping to set up a medical unit capable of providing a wide range of radioisotope diagnostic services to meet the demand throughout the country. Extensive use of the unit's services is already being made by other medical institutions, and continuing support for this project has been planned in a manner designed to meet growing needs.

87. During a short-term assignment another expert was able to assist in the design and development of prototype nuclear light sources - such as gas-filled tritium light sources for the illumination of signs, instrument and telephone dials - thus making possible the local production of sufficient types to meet the country's future needs. In another country, the Agency's expert successfully adapted his technological expertise gained in other countries to meet local needs, and - as part of an approved Government programme for the introduction of nuclear power - he carried out economic and technical feasibility studies on the construction of fuel fabrication plants. A further phase of Agency assistance for the Government's programme will involve the provision of expert services for fuel fabrication plant design, the specification of equipment, etc. As in previous years, recipient Governments have expressed appreciation of the manner in which Agency experts have carried out their assignments and have adapted their skills to meet requirements such as those mentioned above.

88. The effectiveness of Agency assistance continues to be hampered when Governments embark on projects without making appropriate budgetary provision for counterpart personnel and the foreign exchange needed for an adequate supply of isotopes and spare parts for equipment. Furthermore, inflexible financial regulations in developing countries have, on occasion, hampered project implementation; the necessity for directors of national research institutes to obtain authority to incur expenditures has been noted in three countries. Special attention is therefore paid during project formulation to obtaining assurances from Governments that they will be in a position to absorb the technical assistance provided and to carry on the programmes after such assistance has ceased.

89. It has been noted in previous reports and in similar reports of other United Nations agencies that insufficient attention is paid to the conclusions and recommendations of experts set out in their reports to recipient Governments. In this connection, however, there has been an improvement in several countries. For example, in 1969 a regional adviser identified a large number of possible industrial applications of nuclear energy in one country and, in 1971, the Government decided to implement a project on the polymerization treatment of wood; the project has been carried on by another expert to the point where, based on his recommendations, the Government has decided to establish a pilot plant for the annual production of 50 tons of wood-plastic material. Elsewhere, following the recommendations made in 1971 by atomic energy planners, projects consisting of thickness gauging and materials testing in new building and road construction in one country and isotope hydrology studies for rural water supplies in another country were started in 1972 or will start in 1973, and are likely to make an impact on specific sectors of the national development plans.

3. Survey of the impact of training

90. It was stated in last year's report that the Agency would conduct "a survey of the fellows who completed their training during 1959-1963 to establish, in so far as possible, the extent to which their training, together with the experience gained while abroad, has contributed to the development of the industrial, scientific, technological and socio-economic infrastructures, including those related specifically to nuclear energy development and utilization, in their home countries". [15]

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[15] Ibid., para. 82.

91. A circular letter, explaining the purpose and scope of the survey, and a questionnaire were sent to 1088 former Agency fellows from 41 countries. These letters and questionnaires were transmitted through official channels in the respective countries, and the Agency sought their assistance by encouraging fellows to return completed questionnaires. Eight of the 41 countries are no longer considered to be developing countries but they undoubtedly derived appreciable benefits from the Agency's fellowship programme. By February 1973 a total of 353, or about one third, of the questionnaires had been returned.

92. The following three main relationships were determined in analysing the replies received:

(a) The relationship of Agency fellowship training to fellows' subsequent activities (assignments or positions held following completion of training) in the home country;

(b) The relationship of fellows' subsequent activities in the home country to national atomic energy programmes; and

(c) The relationship of fellows' subsequent activities to development efforts in the home country.

The analysis of the data in respect of these three main relationships is presented in paragraphs 93 to 95 below.

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

Relationship	Number of fellows	Percentage of total
Closely related	199	56.4
Closely related initially (later partially related)	39	11.0
Partially related	89	25.2
Unrelated	26	7.4
Total	353	100.0

It is gratifying to note that only about 7% of the fellows in question indicated that their work was unrelated to their fellowship training. In general, fellows reporting their work as being initially "closely" and later "partially" related to their training indicated that the fellowship experience has been very useful.

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

Relationship	Number of fellows	Percentage of total
Directly related	230	65.2
Indirectly related	83	23.2
Unrelated	40	11.6
Total	353	100.0

It is to be noted that the proportion of those who indicated that their work was unrelated to national atomic energy programmes is slightly higher than in paragraph 93 above. The

figure of 11.6% includes a sizable number of teaching and research staff of universities as well as fellows who have emigrated, some owing to lack of facilities or relevant projects in the home country.

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

Relationship	Number of fellows	Percentage of total
Closely related	237	67.0
Partially related	102	28.6
Unrelated	14	4.4
Total	353	100.0

It is to be noted that of the 14 fellows who indicated that their work was unrelated to their country's development efforts, seven emigrated to other countries subsequent to their fellowship training. More than 60% of the former Agency fellows surveyed are doing work in their home countries which is closely or directly related to their fellowship training, the national atomic energy programme and their country's development efforts in one or more sections, whereas in the case of about 29% this relationship is either partial or indirect.

96. The frequency with which sectors in the home country have benefited from the training of former Agency fellows, as indicated in the 353 completed questionnaires analysed, is shown below.

Sector	Number of indications	Frequency (353 = 100%)
Scientific and technological research and development	288	82%
Nuclear energy development and utilization	213	60%
Education	185	52%
Health	72	20%
Industry	57	16%
Energy	44	12%
Agriculture	38	11%
Other	5	1%
Total	902	

From the total number of indications it can be seen that fellows are of the opinion that their Agency training has enabled them to make meaningful contributions to activities in, on average, two or three sectors. It is of interest to note that, although fellows were trained in relatively narrow, specialized disciplines in nuclear science and technology or closely

associated subjects, more fellows were of the opinion that their work had made a contribution to scientific and technological research and development, rather than to nuclear energy development and utilization, and that many of them may have considered the latter to be a sub-sector of the former. One of the fellows who considered that his work was closely related to his training, to the national atomic energy programme and to the development efforts of his home country indicated five sectors to which he - by virtue of his fellowship training - has contributed and stated: "I consider my training as the most important basis for my contribution to the national development efforts of my country. My present job entails a substantial influence on the guarantee of the safe construction and operation of nuclear power plants and on the proper timing of these enterprises .... I consider the fellowship granted me by IAEA always as the basis of my professional life and of the effectiveness of my work".

97. The questionnaire also invited general remarks pertaining to the training received under the Agency fellowship and to its subsequent utilization. Many comments were very complimentary. A few fellows felt that a training award of longer duration would have been more beneficial. Some fellows expressed their interest in and need for another training opportunity, such as refresher training and an opportunity for renewal of contacts with the staff of more advanced centres, pointing out that since they were now much more experienced and in many cases in a more senior position, they could make more effective use of the additional training received. Three of the general remarks contained in the questionnaires are set out below.

(a) "The fellowship under survey, as well as the second one I received from IAEA (was 6 years after) enabled me to improve my knowledge in the area of nuclear science and to understand the possibilities of peaceful uses of it. The result of these two fellowships in furthering my own activities and career was my Doctor's degree, and also a series of scientific publications, all of which are related to practical applications of atomic energy. My efforts to organize and direct the programme of radionuclidic and radiochemical control of radiopharmaceuticals, and also my general contribution to the whole programme of radiopharmaceuticals in my country is the best evidence of how fruitful were, for my country and myself, the 2 fellowships awarded by IAEA. Taking this opportunity I would like to express my gratefulness for IAEA support".

(b) "The knowledge and experience acquired since the former fellowship has effectively assisted in the recent establishment of a large-scale research programme, initiated to improve cattle meat and milk production by means of appropriate trace mineral supplementation".

(c) "Accomplishments on which my fellowship training has had direct bearing are about 40 publications in radiation chemistry of polymers, and a textbook written in my national language on Practical Radiation Chemistry.... Based on experience gained during my fellowship, I have completed a 'candidate work' on radiation polymerization, accepted by our National Academy of Sciences. In the department which I supervise, several processes have been developed to semi-industrial, or industrial scale, using high energy radiation".

98. A careful study of the questionnaires received so far - from former Agency fellows from 35 countries varying widely in the degree to which nuclear science and technology have been effectively introduced into their industrial, scientific, technological and socio-economic infrastructures - justifies the assumption that the trends noted in the survey of the impact of training will not be significantly affected by data still to be received. The preliminary findings given above will be brought up to date in next year's report.

4. Intercountry training projects

99. The Agency's intercountry training programme, which varies from year to year, consists of a combination of demonstration projects, multicountry advisers, review and survey courses, study tours, scientific visits, training courses and visiting seminars organized on a regional or interregional basis in the manner best suited to meet the needs of prospective participating countries. Until 1972 more than 50% of Agency projects of this type was financed by UNDP. Excluding the project for the eradication of the Mediterranean fruit fly in Central America, which was phased out in 1972, only one Agency intercountry project - out of a total of 11 - was financed by UNDP in 1972, namely, the interregional training course on the maintenance and repair of nuclear electronic equipment, held at the ILO training centre at Turin, Italy. An electronics training course of this kind was also held at the Turin centre in 1968, 1970 and 1971. Although the location of training courses on subjects such as industrial applications, isotope hydrology, nuclear medicine and radiation protection, usually organized on a regional basis, is changed from region to region as required, the electronics training course has been the only one so far that has merited repetition on an annual and interregional basis. The reason why training in electronics has become so popular is explained in paragraph 100 below.

100. The growth in the peaceful uses of atomic energy in the developing countries has created the demand for more nuclear electronic equipment to support projects, for example, in agriculture, clinical medicine, life sciences and nuclear engineering. Following the discovery of the transistor 25 years ago, the trend in electronics has been, and still is, towards improved operational capability, greater system complexity and a reduction in the size of equipment items. This trend is not limited to the equipment used for routine work but extends to the entire field of nuclear instrumentation and control. Inevitably, the acquisition of numerous items of modern, often highly sophisticated, nuclear electronic equipment has created a requirement for additional, well-qualified electronics technicians to ensure that such equipment is not only properly maintained but used in a flexible and most effective manner. On the other hand, few developing countries have the training potential to keep abreast of the rapid changes taking place in electronics, and they must therefore rely on a number of foreign specialists to ensure the smooth operation of equipment and prevent undue delay in the implementation of important programmes. It is now obvious that the solution of the problem is to improve the qualifications of existing electronics technicians and train additional people in the subject. A country with a surplus of engineers and physicists could train some of them in electronics; the specialized training of technicians, however, is considered to be a more efficient way of using available skilled manpower.

101. The growing requirement for qualified electronics technicians was recognized by the Agency in the early 1960s, when plans were formulated for the organization of group training in a developing country for technicians from countries in the geographical region. The training courses held on a regional basis in 1964 and 1966 were not as effective as was hoped and it was therefore decided to conduct future group training for electronics technicians in a developed country and on an interregional basis. The experience gained at the ILO centre since 1968 indicates that the improvements made in the quality and variety of the demonstration equipment provided for the course facilitated the conduct of an effective training programme. The decisive factor in determining the degree of success of the course, however, was the professional background of individual participants.

102. The content of the Agency's training course has been modified each year to take account of new developments in electronics, to the extent that available resources permitted. The gradually increasing complexity of the work programme has created a need for ever better qualified participants. Participation in the course was limited initially to technicians, but as from 1968 candidates with an academic background related to electronics and the use of nuclear electronic equipment were given preference at the selection stage, resulting in an increase in the percentage of total participants who were non-specialist

engineers, scientists and technologists. It is assumed that these engineers, scientists and technologists will be used in their home countries to supervise electronics workshop activities and the local training of electronics technicians.

103. Tests are held at the beginning of the course to determine the training needs of participants and to decide on the detailed training programme that will ensure the appropriate technical level of instruction. Participants are told at the outset that oral and written examinations will be held at the end of the course. These examinations provide a means of assessing the effectiveness of the work programme, the contribution made by lecturers and participants' achievements. The three-month period of instruction is divided almost equally between theoretical lectures and discussions and practical exercises. The results achieved by participants in the years 1968 and 1970-72 are shown below.

Results	Year			
	1968	1970	1971	1972
Satisfactory or better	10	15	14	12
Borderline	4	4	2	2
Unsatisfactory	1	5	2	-
Total number of participants	15	24	18	14

Experience has shown that 14-16 is the optimum number of participants for individual courses.

104. The demand for qualified electronics technicians can be expected to increase sharply with the introduction of nuclear power into the developing countries, resulting in a gap between the number of available trained personnel and the number of qualified technicians required. The group training organized by the Agency cannot fill this gap, however, even if the Agency maintains its training course programme in electronics, which is concerned more and more with problems of equipment design and instrumentation systems rather than with equipment maintenance and repair. This is so because the Agency, at present, can train only 14-16 persons, that is, one candidate a year for each of up to 16 countries. The developing countries can help themselves by training their electronics technicians to a higher level of proficiency and, if it is not possible to send them to the Agency's course, by permitting them to work with a former Agency electronics training course participant, or with a well-qualified foreign electronics specialist. Another alternative is to nominate such candidates for advanced training abroad under an Agency fellowship.

Part III. TRENDS AND CONCLUSIONS

A. TRENDS

105. The increasing emphasis on nuclear technology reflected in the requests for assistance is in turn a reflection of the needs for increased energy in developing Member States. At present, eight Member States receiving technical assistance have nuclear power stations in operation or under construction. Many others, foreseeing the shortage of conventional power sources in the next two decades, have carried out or are carrying out feasibility studies. The whole process of the introduction of nuclear power requires the State concerned to start planning at least eight to ten years before a nuclear plant is to go into operation, and in preparation for this work the technical assistance programme is being increasingly utilized by Member States for the essential training of personnel.

106. The nuclear power market survey, initiated in 1972, involves the analysis of the future power requirements of fourteen countries as a basis for determining the over-all requirements for all developing countries. Although the analyses are not yet complete, there are indications that the smallest unit sizes for nuclear power plants will probably be in the range of 200-300 MW(e) and that the market in the period up to 1990 will not be as large as previously estimated. There will, however, undoubtedly be a market of fair size for nuclear power plants in the developing countries; its size will be largely dependent on the future relationship between oil and nuclear fuel prices. Current estimates indicate that there will be an increase of at least 6% per year in petroleum prices as against only 2-4% per year in nuclear fuel prices over the next 10-15 years. This advantage is partly offset by recent capital cost increases, which have been occurring at a slightly greater rate for nuclear plants than for fossil fuel powered plants. It is believed, however, that these increases will not have a significant effect on the market in the developing countries and that power from nuclear sources may well be more attractive economically, in many developing countries, than that from fossil fuel sources. The Agency's technical assistance programme would be influenced by such a development and by the anticipated world power shortage, and both of those factors are expected to be reflected in increased requests to the Agency for assistance.

107. It is possible to identify four stages with regard to the introduction of nuclear power. The first is a preliminary survey by the Government. The second is a preliminary study, which could require a total of one or two man-years of effort, by experts; technical assistance is utilized at this stage, particularly to show if the time scale is realistic. The third stage is a feasibility study, which is normally carried out by a firm of consulting engineers and followed by the preparation of tenders and the provision of assistance in evaluating the bids received. For this stage, the Agency's technical assistance programme is utilized, especially in helping the Government to choose a suitable consultant engineering firm. At the fourth stage assistance is provided in supervising the construction work and in the eventual commissioning of the power reactor, which is normally carried out by one of the consultant engineering firms.

B. CONCLUSIONS

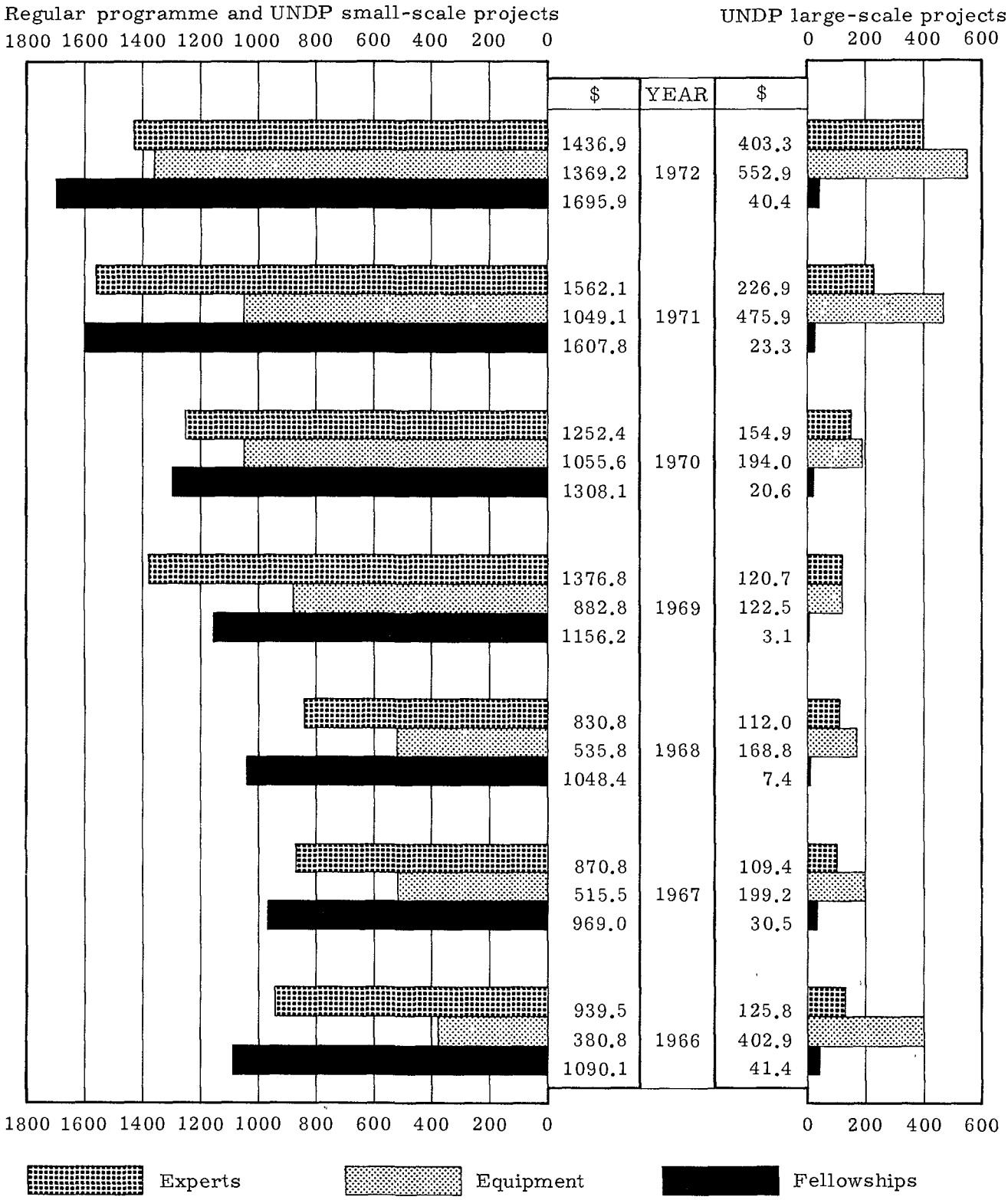
108. The financial situation with which all multilateral aid programmes are confronted is giving cause for concern, and the Agency's regular programme of technical assistance, covering experts, equipment and exchange and training activities, is no exception. While there has been a most welcome increase in the percentage of the target of $3 million for voluntary contributions to the General Fund for 1973 that has been contributed, it is to be noted that most of the increase is offset by inflation. The UNDP Administrator has recently pointed out that "Programme costs in dollar terms expressed as a percentage from one year to the next show minuscule increases .... Such increases in real terms represent a static

or slightly declining programme, taking into account the effects of mandatory cost increases and of inflation". The cost to the Agency of providing expert services has increased by 55% since 1962, the cost of equipment is now rising at an estimated rate of 12% per year, and the cost of fellowship training has increased by over 80% in the last 12 years. It is therefore obvious that unless there is a substantial increase both in the target and in the voluntary contributions to the General Fund, there will be less technical assistance provided by the Agency. The target of $3 million in 1972 is equivalent in real terms to $2 million in 1962, taking into account the increase that has occurred in the costs of goods and services.

109. Following the introduction of country programming procedures by UNDP, experience has shown that the need for a regular programme, to be used as "seed money" for large-scale projects which are financed from UNDP over a longer period of years than that under the regular programme, is essential. While UNDP funds can be made available for various forms of assistance in preparation for country programmes and for the actual formulation of national projects within those programmes, such funds cannot be made use of to the same extent for the development of atomic energy programmes, which requires a longer preparatory period than in the case of projects of a more conventional character. Thus the application of nuclear technology to economic and scientific development in developing countries requires the provision of expert advice over a period of at least a year, together with some equipment and provision for the training of counterparts in the initial period, with a view to carrying out a large-scale project.

FIGURE 7A

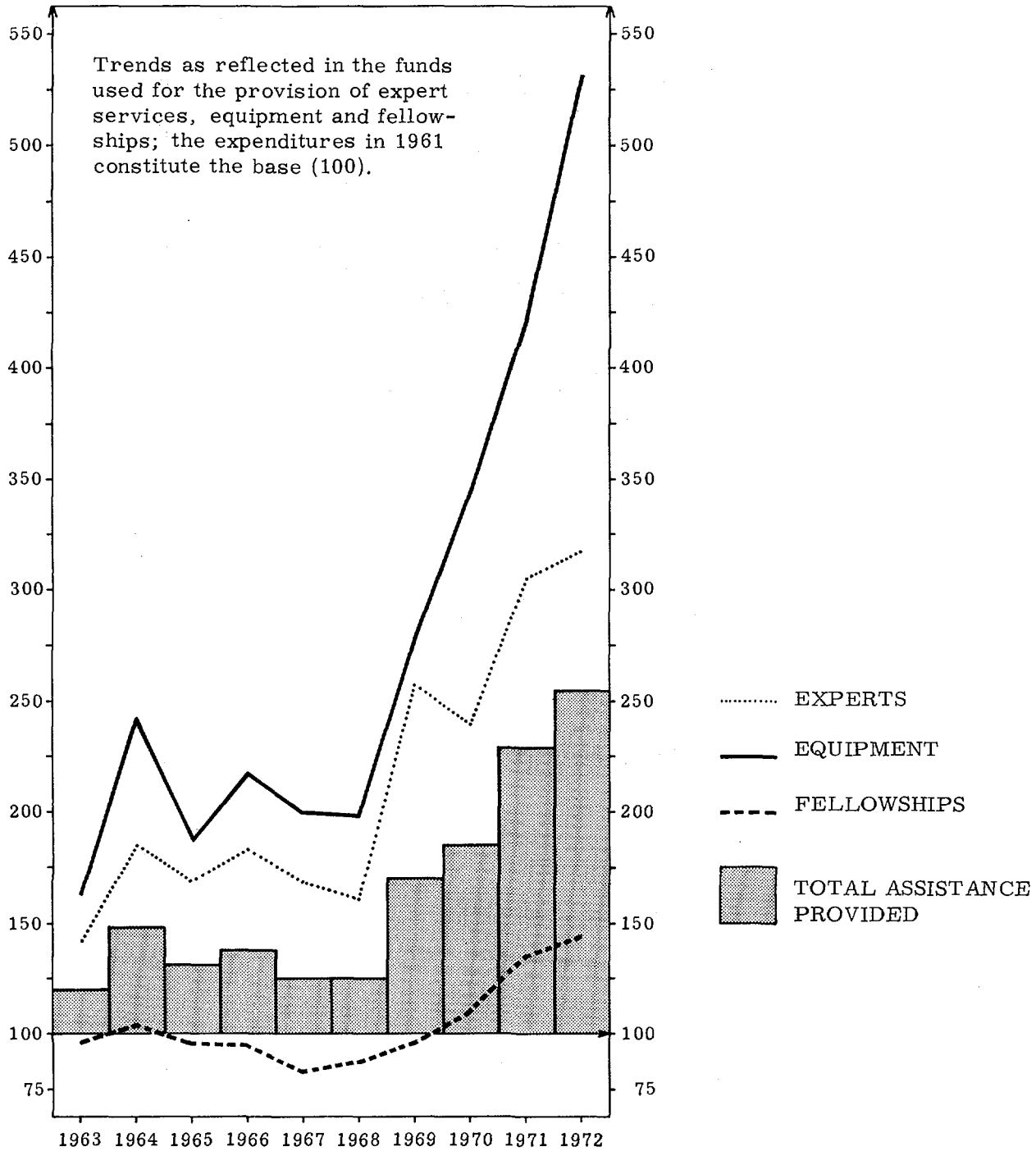
TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY
(in thousands of dollars)



a) The UNDP large-scale project figures given above in respect of experts and equipment include expenditures on sub-contracts and miscellaneous project costs; these amounted to $280 500 in 1966, $129 300 in 1967, $76 200 in 1968, $70 500 in 1969, $1100 in 1970, $35 100 in 1971 and $203 800 in 1972.

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 1972; 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. In Tables 4, 7 and 8, the assistance provided by the Agency (experts, equipment and fellowships) includes actual cash payments against 1972 and prior years' obligations, regardless of the time when funds were made available or obligated, plus the total value of assistance in kind, shown according to the year in which it was provided. Thus, the unpaid balance of funds obligated in 1972 is not included in the financial data relating to assistance provided, but is shown separately in column 9 of Table 4; the total cumulative unpaid balance of funds obligated in 1972 and prior years is given at the bottom of this column in Tables 4, 7 and 8.

4. Assistance in kind has been separated into two parts. The first part consists of assistance which has been provided - for example, fellowship training already provided -

expressed in terms of estimated cash expenditures. The second part is made up of assistance which is in the process of being provided - for example, fellowship training not yet completed - which is equivalent to unliquidated obligations (see column (10) in Tables 4, 7 and 8). The provision of expert services and equipment in kind has been shown in the same way.

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

Types of assistance

6. (a) Experts. When not shown separately, the assignments of lecturers and visiting professors are included under the heading "Experts". With regard to Table 6, it should be noted that under "Intercountry programmes" the assignments of a number of experts are not 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 intercountry programmes; and

(c) Fellowships. In Table 3, where awards are classified by place of study, columns relating to short-term regional training projects and scientific visits have been introduced in order to reflect more accurately the valuable contribution made by host countries. The UNDP country, Agency Type I and Type II awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1972 (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" 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 "Intercountry programmes". None of the tables includes any reference to local participants in short-term training projects (see Annex III).

Intercountry programmes

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

Sub-contract activities and funds-in-trust arrangements

8. The statistical tables do not include data relating to isotope hydrological services provided by the Agency under sub-contracts 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: 1963-1972

(in thousands of dollars)

Year	Agency		UNDP		Sub-totals		TOTAL
	Monetary (1a)	In kind[a/] (1b)	Monetary (2a)	In kind[a/] (2b)	Agency (3)	UNDP (4)	(3) + (4) (5)
1963	1 230	484	1 014	-	1 714	1 014	2 728
1964	1 115	616	1 240	3	1 731	1 243	2 974
1965	1 200	502	1 317	9	1 702	1 326	3 028
1966	1 263	518	1 462	2	1 781	1 464	3 245
1967	1 380	562	1 431	5	1 942	1 436	3 378
1968	1 348	573	1 422	5	1 921	1 427	3 348
1969	1 587	650	981	4	2 237	985	3 222
1970	1 749	971	1 513	17	2 720	1 530	4 250
1971	2 214	1 355	1 775	42	3 569	1 817	5 386
1972	2 652	948	2 590	6	3 600	2 596	6 196
1963-1972	15 738	7 179	14 745	93	22 917	14 838	37 755

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

Table 2

Funds for the Agency's regular programme of technical assistance: 1963-1972

(in thousands of dollars)

Item	1963 - 1968	1969	1970	1971	1972	1963 - 1972
Target for voluntary contributions to the General Fund a/	12 000	2 000	2 000	2 500	3 000	21 500
Share of target budgeted for technical assistance	10 407	1 789	1 877	2 437	3 000	19 510
Amount pledged	8 275	1 488	1 673	2 143	2 492	16 071
Actually made available for technical assistance b/	7 536	1 587	1 749	2 214	2 652	15 738

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 1969-1972 exceeds the amount pledged.

Table 3

Experts (classified by place of origin) and fellowship awards (classified by place of study): 1972

Place of origin of experts or place of study for holders of fellowship awards	Experts					Fellowship awards						
	UNDP		Agency		TOTAL	UNDP		Agency				TOTAL
	Paid	Free	Paid	Free		Country	Regional	Type I	Type II	Regional	Scientific visits	
Argentina	3[a]	-	2	-	5	-	-	-	6	-	-	6
Australia	2[a]	-	1	-	3	-	-	1	-	-	-	1
Austria	1	-	3	-	4	-	-	2	2	-	2	6
Bangladesh	1	-	-	-	1	-	-	-	-	-	-	-
Belgium	2	-	2	-	4	-	-	-	5	-	1	6
Brazil	-	-	-	-	-	-	-	-	3	-	-	3
Canada	4[a]	-	3	-	7	-	-	6	-	-	4	10
Costa Rica	-	-	-	-	-	1[b]	-	-	-	-	-	1
CSSR	1	-	3	-	4	-	-	-	4	30	-	34
Denmark	6[a]	-	1	-	7	1[b]	-	-	5	-	1	7
Egypt, A.R.	2	-	6	-	8	-	-	-	-	-	-	-
Finland	-	-	-	-	-	-	-	-	1[c]	15	-	16
France	5[a]	-	8	-	13	2	-	16	12[c]	-	4	34
Germany, F.R.	4[a]	-	11	1	16	2	-	11	9[c]	52	4	78
Greece	-	-	2	-	2	-	-	-	1[c]	-	-	1
Hungary	1	-	3	-	4	-	-	-	4	-	-	4
India	2	-	9	-	11	-	-	-	8	-	1	9
Iran	1	-	-	-	1	-	-	-	-	-	-	-
Israel	-	-	1	-	1	1[b]	-	-	5	-	1	7
Italy	3[a]	-	3	-	6	1	14	1	17	-	3	36
Japan	-	-	3	-	3	1[b]	-	-	8	-	1	10
Korea, R.	-	-	-	-	-	-	-	-	-	-	1	1
Malaysia	-	-	1	-	1	-	-	-	-	-	1	1
Mexico	-	-	-	-	-	-	-	-	1	-	-	1
Netherlands	3	-	2	-	5	-	-	-	9	-	2	11
New Zealand	1[a]	-	1	-	2	-	-	1	-	-	-	1
Norway	-	-	2	-	2	1	-	1	-	-	-	2
Philippines	-	-	1	-	1	-	-	-	1	12	1	14
Poland	3	-	5	-	8	-	-	-	5	-	-	5
Romania	1	-	1	-	2	-	-	-	2	-	-	2
Singapore	-	-	-	-	-	-	-	-	-	-	1	1
Spain	-	-	3	-	3	4[b]	-	1	8	-	-	13
Sweden	4[a]	-	4	10	18	5[b]	-	2	-	30	3	40
Switzerland	-	-	-	-	-	1	-	1	-	-	1	3
USSR	1	-	2	-	3	-	-	-	17	59	1	77
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	1	1
UK	16[a]	-	22	-	38	6	-	32	4[c]	1	5	48
USA	9[a]	-	16	-	25	13[b]	-	21	50	38	7	129
Uruguay	-	-	1	-	1	-	-	-	-	-	-	-
Yugoslavia	2	-	3	-	5	-	-	3	2	-	-	5
IAEA, Austria	5[a]	-	13	-	18	4	-	9	-	12	1	26
Sub-total	83	-	138	11	232	43	14	108	189	249	47	650
Joint Institute for Nuclear Research, Dubna, USSR						-	-	-	1	-	-	1
Pan-American Training Course on Metallurgy, Buenos Aires						-	-	2	-	-	-	2
Trieste Centre						-	-	1	-	-	-	1
Uppsala International Seminar, Sweden						-	-	2	-	-	-	2
Sub-total						-	-	5	1	-	-	6
GRAND TOTAL	83	-	138	11	232	43	14	113	190	249	47	656[d]

a/ Includes the following large-scale project experts, from: Argentina, one; Australia, one; Canada, two; Denmark, two; Arab Republic of Egypt, one; France, three, Federal Republic of Germany, one; Italy, one; New Zealand, one; Sweden, four; United Kingdom, seven; United States, four; IAEA staff, one.

b/ Includes the following large-scale project awards, in: Costa Rica, one; Denmark, one; Israel, one; Japan, one; Spain, one; Sweden, one; United States, four; IAEA, Austria, two.

c/ Includes the following SIDA-financed awards, in: France, one; Federal Republic of Germany, one; Greece, one; United Kingdom, four.

d/ The difference between the number of awards (513) and the number of places of study (656) is due to the fact that 12 fellows studied in two, two in three and one in four different countries; 30 participants in a study tour went to four countries; one participant in a demonstration project in Asia and the Far East and the 14 participants in the scientific visit programme went to two and 47 places of study respectively.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1963-1972

(in thousands of dollars)

TYPE	Experts		Visiting professors		Equipment		Fellowships		Scientific visits		Intercountry projects		Sub-contracts		TOTAL		Assistance outstanding at 31 December 1972		TOTAL (8)+(9)+(10)
																	Unliquidated obligations	In kind balance [a]	
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	(10)	(11)
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	$	$
1963-1968																			
UNDP	2 525.5	36.3	-	-	1811.7	26.0	960.4	13.8	-	-	1114.0	16.0	551.7	7.9	6 963.3	100.0	-	-	6 963.3
Agency monetary	2 143.6	32.5	549.0	8.3	1274.3	19.3	1 967.5	29.9	119.2	1.8	541.8	8.2	-	-	6 595.4	100.0	15 6	-	6 611.0
Assistance in kind [a]	92.9	2.7	-	-	437.4	12.7	2 893.5	83.9	-	-	25.7	0.7	-	-	3 449.5	100.0	-	14.1	3 463.6
TOTAL	4 762.0	28.0	549.0	3.2	3523.4	20.7	5 821.4	34.2	119.2	0.7	1681.5	9.9	551.7	3.3	17 008.2	100.0	15.6	14.1	17 037.9
1969																			
UNDP	699.9	47.2	-	-	365.7	24.6	135.1	9.1	-	-	230.0	15.5	53.5	3.6	1 484.2	100.0	-	-	1 484.2
Agency monetary	578.9	36.7	121.9	7.7	452.8	28.7	336.9	21.3	19.9	1.3	67.3	4.3	-	-	1 577.7	100.0	11.7	-	1 589.4
Assistance in kind [a]	4.3	0.7	-	-	82.0	13.7	503.8	83.9	-	-	10.1	1.7	-	-	600.2	100.0	-	-	600.2
TOTAL	1 283.1	35.0	121.9	3.3	900.5	24.6	975.8	26.7	19.9	0.5	307.4	8.4	53.5	1.5	3 662.1	100.0	11.7	-	3 673.8
1970																			
UNDP	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	130.0	-	1 749.3
Assistance in kind [a]	20.8	2.3	-	-	300.8	33.5	512.7	57.2	-	-	62.8	7.0	-	-	897.1	100.0	-	16.5	913.6
TOTAL	1 200.3	30.1	75.9	1.9	1228.3	30.8	1 034.3	26.0	18.9	0.5	448.2	11.2	(20.3)	(0.5)	3 985.6	100.0	130.0	16.5	4 132.1
1971																			
UNDP	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	0.2	-	1 839.0
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	357.1	-	2 481.7
Assistance in kind [a]	27.0	2.7	-	-	240.4	24.5	630.8	64.3	-	-	83.5	8.5	-	-	981.7	100.0	-	172.9	1 154.6
TOTAL	1 533.8	31.0	60.7	1.2	1401.5	28.4	1 267.8	25.6	26.7	0.5	631.3	12.8	23.3	0.5	4 945.1	100.0	357.3	172.9	5 475.3
1972																			
UNDP	818.3 [b]	39.5	-	-	768.2	37.1	162.8	7.9	-	-	127.5	6.1	195.2	9.4	2 072.0	100.0	499.9	-	2 571.9
Agency monetary	822.2 [b]	32.2	49.6	1.9	801.4	31.4	594.6 [c]	23.3	28.9	1.1	259.3	10.1	-	-	2 556.0	100.0	1023.5	-	3 579.5
Assistance in kind [a]	8.1	0.9	-	-	92.0	10.6	687.0	78.9	-	-	83.5	9.6	-	-	870.6	100.0	-	778.4	1 649.0
TOTAL	1 648.6	30.9	49.6	0.9	1661.6	30.2	1 444.4	26.3	28.9	0.5	470.3	8.6	195.2	3.5	5 498.6	100.0	1523.4	778.4	7 800.4
1963-1972																			
UNDP	5 398.6	39.0	-	-	4129.3	29.9	1 506.0	10.9	-	-	1990.2	14.4	803.4	5.8	13 827.5	100.0	500.1	-	14 327.6
Agency monetary	4 876.1	33.7	857.1	5.9	3433.4	23.7	3 809.9	26.3	213.6	1.5	1282.9	8.9	-	-	14 473.0	100.0	1537.9	-	16 010.9
Assistance in kind [a]	153.1	2.2	-	-	1152.6	17.0	5 227.8	76.9	-	-	265.6	3.9	-	-	6 799.1	100.0	-	981.9	7 780.0
GRAND TOTAL	10 427.8	29.7	857.1	2.5	8715.3	24.8	10 543.7	30.0	213.6	0.6	3538.7	10.1	803.4	2.3	35 099.6	100.0	2038.0	981.9	38 119.5

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

[b] The 1972 figures for "Experts" include miscellaneous and bank charges amounting to $8600 under "UNDP" and $12 800 under "Agency monetary".

[c] The 1972 figures for "Fellowships" include insurance costs amounting to $300 under "Agency monetary".

Table 5

Fields of activity of technical assistance: 1972

Field	Number of expert assignments	Cost of equipment (in thousands of dollars)	Number of fellowship awards [a/]
General atomic energy development	11	55.7	7
Nuclear physics	16	75.8	56
Nuclear chemistry	15	199.6	27
Prospecting, mining and processing of nuclear materials	20	177.6	14
Nuclear engineering and technology	31	284.7	103
Application of isotopes and radiation in agriculture	74	512.1	152
Application of isotopes and radiation in medicine	17	210.5	37
Application of isotopes and radiation in biology	15	104.9	46
Other fields of application of isotopes and radiation	28	261.2	23
Safety in nuclear energy	14	40.0	48
TOTAL	241	1922.1	513

a/ These figures include 172 participants in 10 regional and interregional training prospects and 14 holders of awards for scientific visits.

Table 6

Recipients of expert services and fellowship awards: 1972

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			
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Country programmes:																		
Albania	-	-	-	-	2	3	-	-	2	3	-	-	-	-	2	18	2	18
Algeria	1	1	-	-	-	-	-	-	1	1	-	-	2	22	-	-	2	22
Argentina	4[a]	8	-	-	4	11	-	-	8	19	-	-	3	32	7	80	10	112
Austria	-	-	-	-	-	-	-	-	-	-	-	-	1	9	-	-	1	9
Bangladesh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	1	2
Bolivia	-	-	-	-	2	1	-	-	2	1	-[b]	-	1	10	1	12	2	22
Brazil	7[a]	31	-	-	3	10	-	-	10	41	1[b]	12	4	42	7	71	12	125
Bulgaria	2	1	-	-	1	1	-	-	3	2	2	6	2	24	10	112	14	142
Burma	1	9	-	-	2	11	-	-	3	20	-	-	-	-	-	-	-	-
Cameroon	2	15	-	-	1	9	-	-	3	24	-	-	-	-	-	-	-	-
Chile	3[a]	12	-	-	2	7	-	-	5	19	-	-	2	24	2	24	4	48
Colombia	-	-	-	-	4	15	-	-	4	15	-	-	2	13	1	10	3	23
Costa Rica	-	-	-	-	1	4	-	-	1	4	-	-	2	18	-	-	2	18
Cuba	-	-	-	-	1	7	-	-	1	7	-	-	-	-	5	40	5	40
Cyprus	-	-	-	-	2	10	-	-	2	10	-	-	1	9	1	12	2	21
CSSR	-	-	-	-	-	-	-	-	-	-	3	4	4	22	9	75	16	101
Ecuador	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-
Egypt, A.R.	-	-	-	-	3	10	-	-	3	10	2	16	4	34	12	114	18	164
El Salvador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Ethiopia	1	11	-	-	-	-	-	-	1	11	-	-	1	1	-	-	1	1
Ghana	-	-	-	-	1	1	-	-	1	1	-	-	1[c]	4	1	2	2	6
Greece	5[a]	49	-	-	7	11	-	-	12	60	-	-	4	33	8	68	12	101
Guatemala	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	1	6
Hungary	3	2	-	-	1	3	-	-	4	5	2	6	4	41	5	40	11	87
India	10[a]	53	-	-	3	9	-	-	13	62	8[b]	68	7	44	11	115	26	227
Indonesia	3	6	-	-	5	21	-	-	8	27	-	-	3	30	4	37	7	67
Iran	2	15	-	-	1	1	1	1	4	17	-	-	1	6	2	16	3	22
Iraq	2	10	-	-	1	5	-	-	3	15	-	-	2	18	11	91	13	109
Israel	-	-	-	-	1	1	-	-	1	1	-	-	-	-	1	11	1	11
Ivory Coast	1	12	-	-	-	-	-	-	1	12	-	-	-	-	-	-	-	-
Jamaica	-	-	-	-	1	9	-	-	1	9	-	-	-	-	-	-	-	-
Jordan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Kenya	-	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	1	6
Korea, R.	-	-	-	-	3	7	-	-	3	7	-	-	3	30	8	82	11	112
Lebanon	1	1	-	-	1	11	-	-	2	12	-	-	-	-	-	-	-	-
Liberia	1	8	-	-	1	4	-	-	2	12	-	-	-	-	-	-	-	-
Malaysia	-	-	-	-	5	12	-	-	5	12	-	-	-	-	-	-	-	-
Mexico	4	4	-	-	8	28	-	-	12	32	1	12	4	39	-	-	5	51
Morocco	2	11	-	-	1	12	-	-	3	23	-	-	3	22	-	-	3	22
Nigeria	1	2	-	-	1	6	-	-	2	8	-	-	2	24	1	2	3	26
Pakistan	4[a]	29	-	-	1	1	-	-	5	30	-	-	5	46	8	82	13	128
Panama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	24	2	24
Peru	1	2	-	-	1	1	-	-	2	3	1	12	-	-	6	72	7	84
Philippines	5[a]	6	-	-	3	7	-	-	8	13	2	18	3	36	11	102	16	156
Poland	1	1	-	-	1	1	-	-	2	2	2	5	5	46	6	62	13	113
Romania	3[a]	2	-	-	2	2	-	-	5	4	2	6	3	34	13	122	18	162
Senegal	-	-	-	-	3	1	-	-	3	1	-	-	-	-	-	-	-	-
Sierra Leone	-	-	-	-	1	2	-	-	1	2	-	-	-	-	1	12	1	12
Singapore	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-
Sri Lanka	-	-	-	-	2	7	-	-	2	7	-	-	3[c]	19	2	4	4	21
Sudan	-	-	-	-	2	13	-	-	2	13	-	-	2	17	1	3	3	20
Syrian A.R.	-	-	-	-	2	10	-	-	2	10	-	-	2	15	5	48	7	63
Thailand	2	8	-	-	3	22	-	-	5	30	1	12	4	36	8	91	13	139
Tunisia	-	-	-	-	2	3	-	-	2	3	-	-	2	9	-	-	2	9
Turkey	3	22	-	-	5	6	-	-	8	28	3	34	4	36	5	51	12	121
Uganda	1	5	-	-	2	16	-	-	3	21	-	-	1	4	-	-	1	4
Uruguay	-	-	-	-	2	2	-	-	2	2	-	-	1	6	1	9	2	15
Venezuela	1	8	-	-	2	10	-	-	3	18	-	-	-	-	-	-	-	-
Viet-Nam	-	-	-	-	1	3	-	-	1	3	-	-	1	12	4	36	5	48
Yugoslavia	3	3	-	-	3	5	-	-	6	8	-	-	2	24	4	36	6	60
Zaire, R.	-	-	-	-	3	24	-	-	3	24	-	-	3	31	-	-	3	31
Zambia	1	12	-	-	1	9	-	-	2	21	-	-	-	-	1	12	1	12
Sub-total	81	359	-	-	113	387	1	1	195	747	31	217	105	928	189	1822	325	2967

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			
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercountry programmes																		
Short-term training projects	7	18	-	-	29	25	10	2	46	45	14	44	125	148	33	40	172	232
Scientific visits	-	-	-	-	-	-	-	-	-	-	2[b]	3	14	19	-	-	16	22
Sub-total	7	18	-	-	29	25	10	2	46	45	16	47	139	167	33	40	188	254
GRAND TOTAL	88	377	-	-	142	412	11	3	241[d]	792	47	264	244	1095	222	1862	513	3221

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

a/ Includes the following large-scale project experts: one/4 man-months, Argentina; two/10 man-months, Brazil; two/7 man-months, Chile; four/48 man-months, Greece; ten/52 man-months, India; four/29 man-months, Pakistan; four/5 man-months, Philippines; three/2 man-months, Romania.

b/ Includes the following large-scale project awards: two/13 man-months, Brazil (including a 1 man-month award for scientific visits); five/47 man-months, India.

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

d/ The difference between the number of assignments (241) and the actual number of experts (232) is due to the fact that each of five experts served in two and two in three different countries.

Table 7

Financial summary: 1972

(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1972		TOTAL (8) + (9) + (10)
					UNDP		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind [a]	Monetary	In kind [a]	TOTAL	Unliquidated obligations	In kind balance [a]	
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Country programmes:												
Albania	8.4	10.6	-	19.0	-	-	19.0	-	19.0	4.2	3.5	26.7
Algeria	2 2	-	6.9	9.1	2.2	-	6.9	-	9.1	3.2	-	12.3
Argentina	29.5	-	18.1	47.6	10.4	-	25.0	12.2	47.6	88.8	36.8	173.2
Austria	-	-	4.3	4.3	-	-	1.0	3.3	4.3	2.8	-	7.1
Banladesh	-	-	1.0	1.0	-	-	-	1.0	1.0	11.7	-	12.7
Bolivia	1.8	16.2	17.4	35.4	2.9	-	18.5	14.0	35.4	1.0	5.5	41.9
Brazil	68.0	39.5	58.5	166.0	83.9	-	65.3	16.8	166.0	46.5	22.0	234.5
Bulgaria	3.8	47.3	38.3	89.4	26.2	-	49 5	13.7	89.4	22.1	31.9	143.4
Burma	46 7	29.7	4.4	80.8	20.8	-	57.5	2.5	80.8	64.1	4.1	149.0
Cameroon	51.9	47.4	4.8	104.1	79 0	-	25.1	-	104.1	14.6	-	118.7
Chile	30.0	13.5	21.2	64.7	9.6	-	47.2	7.9	64.7	4.1	14 4	83.2
China	-	46.1	37 7	83 8	8.3	-	57.1	18.4	83.8	-	-	83.8
Colombia	29.5	8.2	3.6	41.3	-	-	37.7	3.6	41.3	20.6	46.9	108.8
Costa Rica	7.4	8.0	12.2	27.6	-	-	20.5	7.1	27.6	2.4	-	30.0
Cuba	14.9	58.8	6.5	80.2	16.0	-	58.4	5.8	80.2	32.4	17.5	130.1
Cyprus	18.5	30 8	2.6	51.9	-	-	46.9	5.0	51.9	19.4	12.5	83.8
CSSR	-	-	27.2	27.2	3.9	-	10.3	13.0	27.2	12.4	26.0	65.6
Ecuador	0.7	-	1.9	2.6	-	-	1.0	1.6	2.6	0.5	-	3.1
Egypt, A R.	19.1	84.4	59 6	163.1	50.0	-	65.6	47.5	163.1	81.3	65.6	310.0
El Salvador	-	-	3.4	3.4	-	-	-	3.4	3.4	-	4.8	8.2
Ethiopia	21.9	6.4	3.4	31.7	21.9	-	9.8	-	31.7	-	-	31.7
Ghana	2.1	30.7	6.0	38.8	-	-	37.2	1.6	38.8	29.7	-	68.5
Greece	25.3	21.7	54 0	101.0	19.6	-	62.4	19.0	101.0	12.8	24.4	138.2
Quatemala	0.4	-	3.9	4.3	2.5	-	1.8	-	4.3	2.1	26.4	32.8
Hong Kong	-	-	-	-	-	-	-	-	-	32.3	-	32.3
Hungary	8.9	47.9	57.8	114.6	17.3	-	73.6	23.7	114.6	24.5	16.5	155.6
Iceland	-	-	0.1	0.1	-	-	0.1	-	0.1	-	-	0.1
India	18.2	60.2	126.7	205 1	29.4	-	132.6	43.1	205.1	66.5	61.8	333.4
Indonesia	58.3	20.3	29.8	108.4	17.4	-	73.8	17.2	108.4	31.1	26.8	166.3
Iran	39.0	23.2	15.5	77 7	53.5	-	19 9	4.3	77.7	18.4	7.3	103.4
Iraq	30 0	32.0	62.8	124.8	18.9	-	73.1	32.8	124.8	70.5	32.1	227.4
Israel	3.9	24.3	30.1	58.3	-	-	16.3	42.0	58 3	28.2	3.8	90.3
Ivory Coast	23.5	12.7	-	36.2	36.2	-	-	-	36.2	-	-	36.2
Jamaica	23.5	-	-	23.5	-	-	23.5	-	23.5	-	-	23.5
Jordan	-	10.0	14.0	24.0	10.0	-	11.3	2.7	24.0	10.2	5.5	39.7
Kenya	-	-	2.8	2.8	-	-	2.8	-	2.8	-	-	2.8
Korea, R.	18.9	12.8	67.9	99.6	-	-	49.5	50.1	99.6	27.3	42.8	169.7
Lebanon	22.3	40.0	1.1	63.4	24.2	-	39 2	-	63.4	25.6	-	89.0
Liberia	25.3	0 3	-	25.6	16.2	-	9 4	-	25.6	0.1	23.9	49.6
Libyan A.R.	-	7.7	-	7.7	-	-	7.7	-	7.7	-	-	7.7
Madagascar	0.2	-	8.4	8.6	-	-	8.6	-	8.6	0.5	-	9.1
Malaysia	18.3	2.1	0.1	20.5	-	-	20.5	-	20.5	26.2	-	46.7
Mali	-	4.0	-	4.0	-	-	4.0	-	4.0	-	-	4.0
Mexico	59.3	57.7	18.5	135 5	29.6	-	103.9	2.0	135.5	50.1	-	185.6
Morocco	45.1	23.1	17.9	86.1	21.7	-	58.7	5.7	86.1	45.4	3.6	135.1
Nigeria	26.0	0.3	21.2	47.5	20.1	-	23.0	4.4	47.5	9.2	-	56.7
Pakistan	2.0	11.8	19.5	33.3	-	-	22.3	11.0	33.3	71.10	52.2	156.5
Panama	(0.1)	2.2	14.5	16.6	-	-	2.1	14.5	16.6	-	7.0	23.6
Peru	5.2	7 2	7.0	19.4	8.7	-	8.6	2.1	19.4	-	99.6	119.0
Philippines	18.5	49 5	90.2	158.2	12.0	-	91.8	54.4	158.2	14.0	34.2	206.4
Poland	4.7	24.0	70.8	99.5	30 6	-	34.8	34.1	99.5	37.4	14.9	151.8
Romania	5.6	13.2	58.6	77.4	3.0	-	31.4	43.0	77.4	101.6	46.7	225.7
Senegal	1.8	10.0	3.9	15.7	-	-	14.8	0.9	15.7	1.8	-	17.5
Sierra Leone	3.0	0.4	9.0	12.4	-	-	5.4	7.0	12.4	11.2	5.0	28.6
Singapore	5.8	33.5	2.0	41.3	-	-	23.9	17.4	41.3	1.8	-	43.1
Spain	-	-	2.6	2.6	-	-	2.6	-	2.6	-	-	2.6
Sri Lanka	32 1	34 6	15.6	82.3	0.7	-	59.6	22.0	82.3	29.6	-	111.9
Sudan	33.2	1.6	4.4	39.2	-	-	38.1	1.1	39.2	18.7	-	57.9
Syrian A R.	22.7	12.3	19.6	54.6	6.4	-	38.7	9.5	54.6	38.7	15.2	108.5
Tanzania, U.R.	-	-	1.6	1.6	1.6	-	-	-	1.6	-	-	1.6

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1972		TOTAL (8) + (9) + (10)
					UNDP		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind [a]	Monetary	In kind [a]	TOTAL	Unliquidated obligations	In kind balance [a]	
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Thailand	66.1	36.7	89.8	192.6	25 5	-	92.7	74.4	192.6	75.0	42.8	310.4
Tunisia	3.3	4.0	3.4	10.7	-	-	10.6	0.1	10.7	2.2	-	12.9
Turkey	57.2	26 5	60.3	144 0	85 3	-	36 4	22.3	144.0	21.0	42.7	207.7
Uganda	45.1	8 1	1.9	55 1	7.9	-	47.0	0.2	55.1	7.9	-	63.0
Uruguay	5.0	101.2	18.3	124.5	73.1	-	36.3	15.1	124 5	37.4	2 8	164.7
Venezuela	37.8	-	-	37.8	12.2	-	25.6	-	37.8	1.7	7.9	47.4
Viet-Nam	7.2	21.0	2.3	30.5	-	-	29.6	0.9	30.5	4 7	33.1	68.3
Yugoslavia	14.3	15.7	42.3	72.3	19.5	-	23.1	29.7	72 3	31.0	8.1	111.4
Zaire, R.	60 4	15.8	18.8	95.0	-	-	95.0	-	95.0	17.8	-	112.8
Zambia	48.7	10.7	4.6	64.0	24.9	-	38.0	1.1	64.0	8.4	3.3	75.7
Sub-total	1282.4	1317.9	1432.6	4032.9	963.1	-	2283.6	786.2	4032.9	1475 7	981.9	6490.5
Intercountry programmes.												
Africa	-	7.3	-	7.3	7 2	-	0 1	-	7.3	-	-	7 3
Asia and the Far East	38.0	6.8	23.7	68.5	14.8	-	39.2	14.5	68.5	17.7	-	86.2
Latin America	27.8	9.9	2.9	40.6	40.6	-	-	-	40 6	-	-	40 6
Interregional projects	76 2	41.3	236.4	353.9	64.9	5.2	220.0	63 8	353.9	126.2	-	480.1
Sub-total	142 0	65 3	263.0	470 3	127.5	5.2	259.3	78 3	470 3	143.9	-	614.2
Miscellaneous	12.8	-	0.3	13.1	-	-	13.1	-	13.1	-	-	13.1
					UNDP large-scale projects							
Argentina	10.3	-	-	10.3	10.3	-	-	-	10.3	0.4	-	10.7
Brazil	28 6	18.8	2.2	49.6	49.6	-	-	-	49.6	89.3	-	138.9
Chile	16.6	-	-	16.6	16.6	-	-	-	16.6	-	-	16.6
Greece	108.7	16.7	-	125.4	125.4	-	-	-	125.4	0.2	-	125.6
India	143.7	320.5	38.2	502.4	502.4	-	-	-	502 4	302.9	-	805.3
Pakistan	76.8	51.0	-	127.8	127.8	-	-	-	127.8	3.9	-	131.7
Philippines	13.7	84.4	-	98.1	97.2	0.9	-	-	98 1	21.1	-	119 2
Romania	4.6	47.5	-	52.1	52.1	-	-	-	52.1	0.6	-	52.7
Sub-total	403.0	538.9	40.4	982.3	981.4	0.9	-	-	982.3	418.4	-	1400.7
GRAND TOTAL	1840.2	1922 1	1736.3	5498.6	2072.0	6.1	2556.0	864.5	5498.6	2038.0	981.9	8518.5

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

Table 8

Financial summary: 1958-1972

(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1972		TOTAL (8) + (9) + (10)
					UNDP		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind[a]	Monetary	In kind[a]	TOTAL	Unliquidated obligations	In kind balance[a]	
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Country programmes:												
Afghanistan	74.9	76.1	56.2	207.2	70.1	-	84.0	53.1	207.2	-	-	207.2
Albania	12.4	37.4	13.3	63.1	-	-	49.8	13.3	63.1	4.2	3.5	70.8
Algeria	13.2	-	43.0	56.2	12.5	-	36.7	7.0	56.2	3.2	-	59.4
Argentina	538.4	327.0	477.2	1342.6	475.1	0.6	561.0	305.9	1342.6	88.8	36.8	1468.2
Austria	62.0	13.8	116.2	192.0	-	-	128.1	63.9	192.0	2.8	-	194.8
Bangladesh	-	-	1.0	1.0	-	-	-	1.0	1.0	11.7	-	12.7
Bolivia	120.7	148.0	100.4	369.1	116.7	-	191.8	60.6	369.1	1.0	5.5	375.6
Brazil	715.3	398.2	501.0	1614.5	709.5	-	617.2	287.8	1614.5	46.5	22.0	1683.0
Bulgaria	9.2	112.9	336.6	458.7	51.7	-	281.7	125.3	458.7	22.1	31.9	512.7
Burma	375.3	221.3	113.1	709.7	437.0	-	206.3	66.4	709.7	64.1	4.1	777.9
Cameroon	143.0	68.6	10.7	222.3	152.1	-	70.2	-	222.3	14.6	-	236.9
Chile	297.0	166.1	198.5	661.6	179.6	-	348.1	133.9	661.6	4.1	14.4	680.1
China	229.7	166.2	554.9	950.8	281.5	-	307.7	361.6	950.8	-	-	950.8
Colombia	210.8	140.9	139.0	490.7	132.0	-	161.0	197.7	490.7	20.6	46.9	558.2
Costa Rica	13.0	20.2	13.7	46.9	-	-	27.6	19.3	46.9	2.4	-	49.3
Cuba	62.4	76.7	15.7	154.8	16.0	-	130.1	8.7	154.8	32.4	17.5	204.7
Cyprus	40.0	64.6	15.2	119.8	23.5	-	90.2	6.1	119.8	19.4	12.5	151.7
CSSR	-	-	319.2	319.2	4.1	-	205.5	109.6	319.2	12.4	26.0	357.6
Denmark	12.9	-	31.3	44.2	-	-	31.2	13.0	44.2	-	-	44.2
Ecuador	47.0	33.0	68.2	148.2	35.5	-	71.2	41.5	148.2	0.5	-	148.7
Egypt, A.R.	303.3	345.0	618.3	1266.6	303.6	0.8	544.5	417.7	1266.6	81.3	65.6	1413.5
El Salvador	41.1	18.8	15.8	75.7	14.1	-	30.1	31.5	75.7	-	4.8	80.5
Ethiopia	36.4	45.8	24.3	106.5	21.9	-	61.0	23.6	106.5	-	-	106.5
Finland	0.5	-	39.4	39.9	1.8	-	7.2	30.9	39.9	-	-	39.9
France	-	-	15.9	15.9	-	-	2.4	13.5	15.9	-	-	15.9
Germany, F.R.	-	1.6	1.4	3.0	-	-	3.0	-	3.0	-	-	3.0
Ghana	241.2	158.6	103.5	503.3	140.8	-	300.8	61.7	503.3	29.7	-	533.0
Greece	552.3	121.2	405.5	1079.0	376.0	-	447.4	255.6	1079.0	12.8	24.4	1116.2
Guatemala	49.4	47.2	35.8	132.4	51.6	-	56.9	23.9	132.4	2.1	26.4	160.9
Haiti	0.9	-	-	0.9	-	-	0.9	-	0.9	-	-	0.9
Hong Kong	20.0	20.6	-	40.6	-	-	40.6	-	40.6	32.3	-	72.9
Hungary	55.2	221.3	435.5	712.0	129.0	-	439.8	143.2	712.0	24.5	16.5	753.0
Iceland	29.0	72.1	25.9	127.0	-	-	74.6	52.4	127.0	-	-	127.0
India	95.5	219.3	827.2	1142.0	250.6	3.6	372.8	515.0	1142.0	66.5	61.8	1270.3
Indonesia	407.9	165.7	599.3	1172.9	235.1	-	483.9	453.9	1172.9	31.1	26.8	1230.8
Iran	528.5	66.8	367.5	962.8	439.5	0.5	307.0	215.8	962.8	18.4	7.3	988.5
Iraq	313.0	106.3	400.8	820.1	238.3	-	347.0	234.8	820.1	70.5	32.1	922.7
Israel	169.1	250.8	157.9	577.8	112.9	-	299.1	165.8	577.8	28.2	3.8	609.8
Italy	9.0	-	160.1	169.1	-	-	95.6	73.5	169.1	-	-	169.1
Ivory Coast	31.4	17.0	2.9	51.3	48.4	-	2.9	-	51.3	-	-	51.3
Jamaica	40.0	21.5	15.2	76.7	10.4	-	46.6	19.7	76.7	-	-	76.7
Japan	50.1	-	322.3	372.4	49.8	-	129.4	193.2	372.4	-	-	372.4
Jordan	28.1	10.0	27.3	65.4	49.6	-	13.1	2.7	65.4	10.2	5.5	81.1
Kenya	31.9	73.8	12.2	117.9	27.4	-	68.9	21.6	117.9	-	-	117.9
Khmer Republic	85.0	29.3	1.7	116.0	39.1	-	69.6	7.3	116.0	-	-	116.0
Korea, R.	280.1	133.4	698.9	1112.4	115.0	-	499.9	497.5	1112.4	27.3	42.8	1182.5
Kuwait	5.5	-	3.9	9.4	-	-	9.4	-	9.4	-	-	9.4
Lebanon	106.0	74.4	48.4	228.8	24.2	-	186.4	18.2	228.8	25.6	-	254.4
Liberia	43.4	4.5	-	47.9	16.2	-	27.5	4.2	47.9	0.1	23.9	71.9
Libyan A.R.	0.4	7.7	-	8.1	-	-	8.1	-	8.1	-	-	8.1
Madagascar	16.7	24.3	15.1	56.1	-	-	56.1	-	56.1	0.5	-	56.6
Malaysia	18.3	7.7	12.4	38.4	1.6	-	36.8	-	38.4	26.2	-	64.6
Mali	2.1	15.9	-	18.0	2.1	-	15.9	-	18.0	-	-	18.0
Mexico	457.5	248.1	210.7	916.3	343.7	-	429.7	142.9	916.3	50.1	-	966.4
Monaco	-	-	4.2	4.2	-	-	4.2	-	4.2	-	-	4.2
Morocco	187.6	114.0	84.6	386.2	86.8	-	262.4	37.0	386.2	45.4	3.6	435.2
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	162.5	98.6	70.7	331.8	110.7	-	159.7	61.4	331.8	9.2	-	341.0

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1972		TOTAL (8) + (9) + (10)
					UNDP		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind[a/]	Monetary	In kind[a/]	TOTAL	Unliquidated obligations	In kind balance[a/]	
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Norway	-	-	9.6	9.6	-	-	5.3	4.3	9.6	-	-	9.6
Pakistan	410.3	271.4	454.6	1136.3	263.9	-	562.5	309.9	1136.3	71.0	52.2	1259.5
Panama	17.1	5.4	22.0	44.5	4.1	-	18.4	22.0	44.5	-	7.0	51.5
Paraguay	10.3	4.6	32.1	47.0	-	-	31.3	15.7	47.0	-	-	47.0
Peru	168.6	99.2	48.5	316.3	114.4	-	172.1	29.8	316.3	-	99.6	415.9
Philippines	320.1	406.7	741.9	1468.7	411.6	8.9	529.4	518.8	1468.7	14.0	34.2	1516.9
Poland	14.1	180.0	638.1	832.2	194.1	-	417.4	220.7	832.2	37.4	14.9	884.5
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	40.6	109.8	321.7	472.1	50.6	-	277.8	143.7	472.1	101.6	46.7	620.4
Saudi Arabia	18.8	2.9	10.5	32.2	-	-	25.2	7.0	32.2	-	-	32.2
Senegal	110.6	94.9	15.3	220.8	86.5	0.8	132.6	0.9	220.8	1.8	-	222.6
Sierra Leone	66.5	9.2	13.9	89.6	39.9	-	40.7	9.0	89.6	11.2	5.0	105.8
Singapore	75.4	68.8	7.7	151.9	-	-	130.8	21.1	151.9	1.8	-	153.7
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	230.3	158.1	59.1	447.5	103.8	-	262.7	81.0	447.5	29.6	-	477.1
Sudan	145.9	60.5	51.4	257.8	27.7	-	220.9	9.2	257.8	18.7	-	276.5
Sweden	-	-	8.8	8.8	-	-	8.8	-	8.8	-	-	8.8
Switzerland	-	-	12.6	12.6	-	-	5.6	7.0	12.6	-	-	12.6
Syrian A.R.	26.6	31.1	41.2	98.9	23.1	-	55.9	19.9	98.9	38.7	15.2	152.8
Tanzania, U.R.	4.6	-	2.8	7.4	7.4	-	-	-	7.4	-	-	7.4
Thailand	645.0	206.9	759.6	1611.5	497.8	-	665.6	448.1	1611.5	75.0	42.8	1729.3
Tunisia	191.4	91.9	149.3	432.6	141.2	-	255.3	36.1	432.6	2.2	-	434.8
Turkey	580.3	237.3	556.9	1374.5	420.3	-	587.3	366.9	1374.5	21.0	42.7	1438.2
Uganda	166.5	79.8	13.6	259.9	127.4	-	125.4	7.1	259.9	7.9	-	267.8
USA	-	-	2.6	2.6	-	-	2.6	-	2.6	-	-	2.6
Uruguay	107.9	233.5	62.4	403.8	148.9	-	191.2	63.7	403.8	37.4	2.8	444.0
Venezuela	160.0	34.9	197.5	392.4	38.1	-	193.5	160.8	392.4	1.7	7.9	402.0
Viet-Nam	74.4	102.4	91.0	267.8	31.4	-	132.7	103.7	267.8	4.7	33.1	305.6
Yugoslavia	161.9	253.5	712.8	1128.2	431.8	-	449.5	246.9	1128.2	31.0	8.1	1167.3
Zaire, R.	196.1	62.3	49.0	307.4	9.6	-	273.0	24.8	307.4	17.8	-	325.2
Zambia	118.5	42.7	5.7	166.9	55.5	-	110.3	1.1	166.9	8.4	3.3	178.6
Sub-total	11511.5	7731.2	14270.5	33513.2	9191.6	15.2	15674.0	8632.4	33513.2	1475.7	981.9	35970.8
Intercountry programmes												
Africa	67.2	55.8	39.3	162.3	154.1	2.5	5.7	-	162.3	-	-	162.3
Asia and the Far East	316.7	104.6	145.8	567.1	443.0	33.6	76.0	14.5	567.1	17.7	-	584.8
Europe	21.0	18.6	17.3	56.9	56.9	-	-	-	56.9	-	-	56.9
Latin America	232.0	95.1	118.8	445.9	392.9	14.8	36.6	1.6	445.9	-	-	445.9
Middle East	5.8	1.2	5.3	12.3	12.3	-	-	-	12.3	-	-	12.3
Interregional projects	534.7	281.5	1444.8	2261.0	1003.7	17.9	1064.6	174.8	2261.0	126.2	-	2387.2
Trieste Centre	-	-	210.0	210.0	-	-	210.0	-	210.0	-	-	210.0
Sub-total	1177.4	556.8	1981.3	3715.5	2062.9	68.8	1392.9	190.9	3715.5	143.9	-	3859.4
Miscellaneous	88.3	6.5	0.6	95.4	22.1	-	73.3	-	95.4	-	-	95.4
UNDP large-scale projects												
Argentina	10.3	-	-	10.3	10.3	-	-	-	10.3	0.4	-	10.7
Brazil	28.6	18.8	4.4	51.8	51.8	-	-	-	51.8	89.3	-	141.1
Chile	16.6	-	-	16.6	16.6	-	-	-	16.6	-	-	16.6
Greece	151.0	57.4	-	208.4	208.4	-	-	-	208.4	0.2	-	208.6
India	406.8	816.8	73.6	1297.2	1297.2	-	-	-	1297.2	302.9	-	1600.1
Pakistan	127.0	185.7	-	312.7	312.7	-	-	-	312.7	3.9	-	316.6
Philippines	133.4	233.7	83.1	450.2	447.8	2.4	-	-	450.2	21.1	-	471.3
Romania	4.6	47.5	-	52.1	52.1	-	-	-	52.1	0.6	-	52.7
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
Central America	409.3	575.9	9.4	994.6	985.3	9.3	-	-	994.6	-	-	994.6
Sub-total	1514.4	2537.9	241.1	4293.4	4281.7	11.7	-	-	4293.4	418.4	-	4711.8
GRAND TOTAL	14291.6	10832.4	16493.5	41617.5	15558.3	95.7	17140.2	8823.3	41617.5	2038.0	981.9	44637.4

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

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 1972

Donor	Assistance made available	Value $
Argentina	Training for eight Type II fellowship award holders	9 300
Austria	One lecturer and training for four Type II fellows	5 000
Belgium	Training for seven Type II fellows	14 400
Brazil	Training for three Type II fellows	3 200
CSSR	One lecturer and training for five Type II fellows	3 100
Denmark	Training for eight Type II fellows	6 300
Finland	Training for one Type II fellow	2 600
France	One expert, one lecturer and training for 17 Type II fellows	20 900
Germany, F.R.	Two experts, equipment for a training course, training for 38 Type II fellows and stipends for training course participants	134 700
Hungary	Training for six Type II fellows	3 800
India	Three experts, one lecturer and training for nine Type II fellows	22 300
Iran	One lecturer	5 000
Israel	Training for three Type II fellows	1 800
Italy	One expert and training for 29 Type II fellows	41 200
Japan	One lecturer and training for 14 type II fellows	25 200
Malaysia	One lecturer	1 400
Mexico	Training for one Type II fellow	2 800
Netherlands	Training for ten Type II fellows	13 500
Philippines	Training for two Type II fellows	1 800
Poland	Training for 11 Type II fellows	19 200
Romania	Training for one Type II fellow	700
Spain	Training for 11 Type II fellows	13 300
Sweden	Ten lecturers, equipment and participant stipends for a training course and training for 13 Type II fellows	62 000
USSR	Training for eight Type II fellows	25 300
UK	Two lecturers	500
USA	Two experts, equipment for projects in eight countries and training for 89 Type II fellows	403 700[a/]
Yugoslavia	Training for four Type II fellows	1 600
Joint Institute for Nuclear Research Dubna, USSR	Training for three Type II fellows	10 500
TOTAL	Nine experts, 19 lecturers, equipment for projects in eight countries and two training courses, training for 305 Type II fellows and participant stipends for two training courses	855 100

a/ An additional $15 500 was made available to meet routine host country expenses (cost of facilities and local lecturers) incurred in respect of a training course. This amount has not been included because information was not available regarding the corresponding host country expenses incurred in respect of other training courses and similar projects conducted by the Agency in 1972.

B. Possible assistance to projects not included in the 1972 regular programme owing to lack of funds

Requesting country	Title of the project	Possible supplier	Nature of offer	Value of the assistance provided
Chile	Bioassay	Belgium Finland	Experts only Experts only	Not known Not known
Cuba	Radiopharmacy	Finland	Experts only	Not known
Iraq	Health physics	France	An expert	Not known
Turkey	Use of radioisotopes in industry	Finland	Experts only	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 11 April 1972, brought to the attention of the technically advanced Member States the 44 requests for expert services and equipment which could not be submitted for approval to TAC - as a part of the 1972 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: 1972

Title	Place and dates	Source of funds	Participation 1/ (1)	(2)	(3)
Study tour on radiological protection	CSSR, Germany, F.R., Sweden and USSR 2 May to 9 June	Regular programme	30	-	-
Interregional training course on the use of isotopes and radiation in forestry research	Helsinki, Finland 5 June to 21 July	Regular programme	15	-	3
Interregional training course on the production and quality control of radiopharmaceuticals	Los Angeles, California, USA 5 to 30 June	Regular programme	17	-	7
Study tour on mass rearing of insects as related to the sterile male technique	USA 12 June to 14 July	Regular programme	21	1	-
Study tour on the use of isotopes and radiation in genetics and plant breeding	USSR 4 July to 4 August	Regular programme	29	-	-
Interregional training course on the basic principles of isotope and radiation equipment used in soil research	Hanover, Germany, F.R. 19 July to 6 September	Germany, F.R. and FAO	21	-	-
Interregional training course on the maintenance and repair of nuclear electronic equipment	ILO Centre, Turin, Italy 28 August to 1 December	UNDP and Regular programme	14	-	-
Interregional training course on the use of isotope tracer techniques for studying pesticide problems	Vienna, Austria 18 September to 13 October	SIDA	12	-	-
Regional training course on the use of isotopes and radiation for the development of industrially useful micro-organisms	Manila, Philippines 23 October to 1 December	Regular programme	12	-	7
Co-operative project in neutron scattering	Asia and the Far East 1972	Regular programme	-	-	5
Demonstration project on the use of radiation for the preservation of local food products	Asia and the Far East 1972	Regular programme	1	-	354
Survey and control of the Mediterranean fruit fly in Nicaragua and economic assessment of the present and potential damage	Central America 1972	UNDP	-	-	-

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 SUB-CONTRACTS IN 1972[1/]

Country or region and project number	Title	Cost of sub-contracted services
Bolivia BOL-68-514	Ground water development in the Altiplano (United Nations)	$1 370
Jamaica JAM-70-512	Development and management of water resources (FAO)	810
Lebanon LEB-71-524	Hydro-agricultural development of the Southern Lebanon (FAO)	2 360
Senegal SEN-66-509	Establishment of a master plan for water supply and sewerage for Dakar and surrounding areas (WHO)	7 330
Surinam SUR-70-504	Public water supplies and sewerage (United Nations)	3 170
Africa Regional RAF-66-079	Survey of the water resources of the Chad Basin for development purposes (FAO)	190
	TOTAL	$15 230

1/ The organization for which the sub-contract was carried out is given following the project title.

ANNEX V

EXPERTS' FINAL REPORTS[1/]

Reference number	Name of expert	Subject	Country of assignment
694	N. Spronk	Animal productivity and trace elements	Hungary
695	M.C. Scott	Experimental physics	Pakistan
696	B.R. Payne	Isotopes in hydrology - environmental isotope techniques	Mexico
697	D.S. Urch	Hot atom chemistry	Greece
698	V.I. Moontjan	Waveguide linear accelerator project	Egypt, A.R.
699	I. Friedman	Isotopes in hydrology	Brazil
700	R.L. Shipp, Jr.	Nuclear detectors	Mexico
701	J. Korkisch	Nuclear raw materials analysis	Mexico
702	B.J. Tymons	Radiobiology	Argentina
703	F. Regnaud	Radiochemistry	Argentina
704	B. Hedin	Radioisotopes in medicine	Albania
705	K.H. Waechter	Radioisotopes in industry	Colombia
706	D. Tolchenkov	Nuclear engineering project	Egypt, A.R.
707	M. Vidmar	Health physics	Bolivia
708	Z.W. Brzezinski	Maintenance of nuclear electronic equipment	Iran
709	P.H. Vuister	Electronic engineering project	Nigeria
710	D. Hillel	Radioisotopes in agriculture	Cyprus
711	F.A. Iddings	Use of radioisotopes in industry	Singapore
712	K.C. Tripathi	Gamma spectroscopy	Korea, R.
713	H. Le Van	Use of radioisotopes in medicine	Viet-Nam
716	E.B. Bell	Use of radioisotopes in industry	Singapore
717	I.G. Valencia	Use of radioisotopes in agriculture	Korea, R.
718	W.C. Broadbank	Radioisotope production	Mexico
719	H.C. Mason	Radioisotopes in biology	Turkey
720	A. Covello	Nuclear physics	Uruguay
721	R. Adams	Medical applications of radioisotopes	Israel
722	E. Christensen C. Emborg N. Holm H. Kristensen	Microbiological problems in relation to radiation sterilization	Hungary

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.

Reference number	Name of expert	Subject	Country of assignment
723	L. Wiesner	Radiation protection legislation	Peru
724	Z. Hlasivec	Radiation dosimetry	Panama
725	G. Drexler	Radiation dosimetry	Brazil
726	D. Brune	Activation analysis	Turkey
727	T.W. Conlon	Nuclear physics	Chile
728	K.H. Garder	Environmental monitoring	Mexico
729	T.H. Blewitt	Nuclear metallurgy - radiation damage	Argentina
731	J.A. Hansen	Use of radioisotopes in water pollution studies	Brazil
732	J.C. Tjell	Evaluation of insecticides for tsetse control	Uganda
733	F. El-Bedewi	Experimental nuclear physics	Indonesia
734	M. Oberhofer	Radiological protection	Brazil
735	J. Goens	Role and place of the Institute for Nuclear Studies, Algiers, in the economic development of Algeria 2/	Algeria
736	N.W. Holm K. Pedersen	Dosimetry of gamma radiation sources	Bulgaria
737	V. Vukmirovic	Use of radioisotopes in sedimentology 2/	Brazil
738	C. Dowling	Irradiation in entomology	Peru
739	R.C. Greenwood	Radiation spectra activities	Greece
740	A. Demidov	Nuclear physics	Iraq
741	F. Cope	Radioisotopes in agriculture	Sudan
742	M.M. Bluhm	Nuclear medicine	Thailand
743	G. Hannesson	Radiation food microbiology	Thailand
744	K. Boddy	Radiation protection	Bulgaria
745	A. Coco	Detailed aerial prospection for uranium 3/	Peru
746	R. Hoefer W. Erd	Radioisotopes in medicine	Albania
747	C. McKee	Use of radioisotopes in biochemistry	Singapore
748	K.O. Muennich	Environmental isotope hydrology	Poland
750	W. Scott-Keys	Radioisotopes in hydrology	Greece
751	L. Carneiro	Nuclear Medical Centre, Santa Cruz 3/	Bolivia
752	S. Fukutomi	Reactor data processing	Argentina
753	A. Razzak	Radioisotopes in medicine	Albania

2/ Available in French only.

3/ Available in Spanish only.

Reference number	Name of expert	Subject	Country of assignment
754	N.M. Soonawala	Use of radon emanometry in uranium prospecting	Egypt, A.R.
755	D.M. Power	Food preservation	Poland
756	A. Chekmarev	Use of X-ray fluorescence techniques in mineral prospecting	Egypt, A.R.
757	V. Chernyshevich	Reactor engineering	Iraq
758	P. Reizenstein	Clinical whole body counting	Argentina
759	R. Alvarez	Purity control of radiopharmaceuticals	Greece
760	Z. Spurny	Radiation dosimetry	Romania
762	J.G. Van Kooij	Food irradiation	Chile
763	Z.W. Brzezinski	Maintenance of nuclear electronic equipment	Iran
764	J. Simon	Plant breeding	Burma
765	G.H.S. Hooper	Fruit fly control	Philippines
766	P.R. Bradley-Moore	Use of radioisotopes in medicine	Viet-Nam
767	M. Petrovic	Uranium prospection airborne survey	Chile
768	G.L. Van Amburg	The soil-plant system in relation to the inorganic nutrition of herbage grasses in Nigerian grassland associations	Nigeria
769	R. Alexis	Radioisotopes in industry - X-ray fluorescence	Colombia
770	T. Kawai	Plant breeding	Thailand
771	I.D. Clarke	Use of radioisotopes in agriculture	Nigeria
772	W.E. Liversage	Radiation dosimetry	Turkey
773	M. Hajdukovic	Isotopes in agriculture[2/]	Zaire, R.
774	D.O. Bottrill	Hospital physics	Iraq
775	D.S. Urch	Hot atom chemistry	Greece
776	V.K. Iya	Radiation facility	Philippines
777	J.L. Sarrouy	Nuclear instrumentation	Israel
778	W. Bock-Werthmann	Activation analysis	Greece
779	J.W.B. Stewart	Use of radioisotopes in agriculture	Philippines
780	Y. Barrada W.H. Gardner	Application of isotopes in agriculture	Turkey
781	K.A. Mahmoud	Radiation protection[3/]	Cuba
782	C.K. Yen	Environmental isotope study of Rasce Spring	Yugoslavia
783	G.W.C. Tait	Radiation protection	Zambia

Reference number	Name of expert	Subject	Country of assignment
784	M. Branica	Radiochemistry	Brazil
785	H.G. Fromme	Radiobiology	Argentina
786	A.K. Perkons	Analytical radiochemistry	Venezuela
787	R. Herbert	Radioisotopes in medicine	Jamaica
788	M. El-Harby	Isotope generators	Chile
789	S. Hashish	Application of radioisotopes in biology[2/]	Zaire, R.
790	H. Moser	Application of isotopes in hydrology[3/]	Ecuador
791	J.C. Webb	Atomic energy planning	Malaysia
792	W. Keune.	Mössbauer spectroscopy and metallurgical applications	Brazil
793	R.M. Felder	Radioisotopes in industrial plant kinetics	Brazil
794	J.H. Capaccioli	Atomic absorption spectrophotometry[3/]	Colombia
795	W.D. Jamrack	Nuclear fuel conversion	Mexico
796	R.S. Sharpe	Use of radioisotopes in industry	Singapore