THE PROVISION OF TECHNICAL ASSISTANCE BY THE AGENCY WITH SPECIAL REFERENCE TO 1978

Report by the Director General

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INTERNATIONAL ATOMIC ENERGY AGENCY

PREFACE

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 1978; this material is accordingly reproduced in the present document. The review was carried out pursuant to paragraph 19 of the Revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency[1].

The use of the resources placed at the Agency's disposal, in the form of voluntary contributions, gifts in kind, UNDP funds and other extrabudgetary funds, for the provision of technical assistance is reviewed in this document.

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

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[1] INFCIRC/267.

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List of abbreviations

Agency	International Atomic Energy Agency
IAEA	International Atomic Energy Agency
IBRD	International Bank for Reconstruction and Development
ICTP	International Centre for Theoretical Physics at Trieste
IEA of OECD	International Energy Agency of the Organisation for Economic Co-operation and Development
IIASA	International Institute for Applied Systems Analysis
JINR	Joint Institute for Nuclear Research
MeV	Megaelectron volt
MW(e)	Megawatt (electric)
SIDA	Swedish International Development Authority
Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation

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Byelorussian SSR	Byelorussian Soviet Socialist Republic
Dem. Kampuchea	Democratic Kampuchea
Dem. P.R. Korea	Democratic People's Republic of Korea
German D.R.	German Democratic Republic
Germany, F.R.	Federal Republic of Germany
Korea, R.	Republic of Korea
Libyan A.J.	Libyan Arab Jamahiriya
St. Kitts	St. Kitts-Nevis-Anguilla
Syrian A.R.	Syrian Arab Republic
Ukrainian SSR	Ukrainian Soviet Socialist Republic
USSR	Union of Soviet Socialist Republics
U.A. Emirates	United Arab Emirates
UK	United Kingdom of Great Britain and Northern Ireland
U.R. Cameroon	United Republic of Cameroon
U.R. Tanzania	United Republic of Tanzania
USA	United States of America
Yemen, P.D.R.	People's Democratic Republic of Yemen

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	Application of isotopes and radiation in industry and hydrology
9	Safety in nuclear energy

Part I. GENERAL OBSERVATIONS

1. The total resources allocated for carrying out the Agency's 1978 technical assistance programme amounted to $15 100 000 (Table 1)[2] - $3 448 000, or nearly 30%, more than was available for the programme in 1977. Of this total, 47.1% was derived from Agency funds, 19.4% from extrabudgetary funds, 13.9% from assistance in kind and 19.6% from UNDP funds. The growth was highest in extrabudgetary funds and lowest in Agency funds, but an increase in resources took place in all categories: compared to 1977 the above categories grew by 19.4%, 54.1%, 27.7% and 37.8%, respectively. The significant growth in extrabudgetary funds can best be seen in Figure 1.

2. In 1978 the amount of assistance actually provided from all sources was $13 007 500 (Tables 4 and 7) - nearly $4 million, or 44%, more than the amount ($9 028 200) delivered in 1977. Even if allowance is made for an inflation factor of 7-10%, the increase is the highest for the past eight years. If the unliquidated obligations and the in-kind balance at the year's end ("assistance on the way") are added, the Agency handled a technical assistance programme of $19 820 000 in 1978, compared to $15 374 200 in 1977. This was accomplished with an increase of only one Professional (from 25 to 26) and two General Service staff (from 36 to 38).

3. The $13 007 500 of technical assistance was provided to 77 countries, as shown in Figure 4B and Table 7; 18.8% of it related to the application of isotopes and radiation in agriculture and 18.2% to nuclear engineering and technology. Although the percentages dropped slightly compared to 1977, these two fields continued to be the ones in which the largest shares of Agency assistance were provided.

4. Assistance, including assistance in kind, was provided through the services of 441 experts and lecturers, the supply of equipment costing $5 458 200 and through the award of fellowships for individual study and for participation in training courses, scientific visits and other short-term training projects.

5. Although the number of experts provided in 1978 increased slightly compared to 1977, in monetary terms the technical assistance delivered through the provision of expert services declined from 36.3% to 29.9% of the total assistance provided. Equipment constituted 41.9% of the total assistance delivered in 1978, as against 33.8% in 1977. The fellowship share of the total assistance provided declined slightly, from 29.9% to 28.2%.

6. Despite the very considerable increase in the volume of technical assistance provided in 1978, unobligated balances increased by about one fifth during the year. The unfavourable composition of the Agency's cash resources, however, made a higher implementation rate inadvisable, as explained in Part II.A.2 below. The technical assistance currency situation has resulted in the introduction of new measures, already embodied in the 1979 regular programme, designed to prevent a worsening of the imbalance between the types of currencies available and those needed for anticipated expenditures. It will take a number of years to redress the existing imbalance between convertible and non-convertible currencies.

7. A number of programming missions were fielded in 1978. Their recommendations are reflected in the requests for technical assistance submitted to the Agency by the countries visited in respect of the regular programmes for 1979 and 1980, in which various multi-year projects have been included. Through these missions the Agency strives to stimulate the greatest possible internal coherence between the assistance requested and the general development plans of the countries involved.

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

8. As anticipated, the volume of assistance being provided by UNDP is again growing at a healthy rate. UNDP is undertaking major studies aimed at increasing the efficiency and relevance of its programmes, so as to meet the specific needs of recipient countries, and to help in achieving the global priorities established by the governing bodies of the organizations in the United Nations system that serve as executing agents for UNDP projects. UNDP goes to great lengths to involve all agencies closely in these studies, in order to ensure that the views of the system as a whole are reflected in the resulting documentation. This spirit of partnership is highly appreciated, although the frequent requests for inputs to these studies do place a heavy demand on the Agency's staff.

9. The increase in the volume of technical assistance handled, the very substantial growth in extrabudgetary funds requiring separate monitoring and treatment, and the additional internal and external statistical reporting requirements have exceeded the capacity of the relatively simple computerized reporting system used in the past for technical assistance management purposes. The system, developed more than a decade ago, was not designed to cope with the complexities of a programme involving multi-year projects, multiple funds, and different types of currencies. A study to determine the requirements for a new, more adequate computerized system was carried out in the latter half of 1978. The development of such a system will be carried out in stages, starting in 1979.

10. Although similar in substance to earlier annual reports on technical assistance, the sequence of some of the material has been changed. Details on the development of the Agency technical assistance activities financed from the various available funds are given first, followed by an analysis of the assistance provided. Comments on some areas of technical co-operation of interest to Governments, and also brief descriptions of some selected projects under implementation, conclude the body of the report.

Part II. DEVELOPMENT OF THE AGENCY'S TECHNICAL ASSISTANCE ACTIVITIES

A. THE AGENCY'S REGULAR PROGRAMME

1. Programme implementation in 1978

11. The sum of the voluntary contributions of Member States and the miscellaneous income available for the 1978 regular programme increased by $1 155 000, or 19.4%, as compared with 1977. The volume of the assistance provided from these funds in 1978 increased by $1 530 000, or 30.6%, over the preceding year. The increase again represented a record in the history of the regular programme and was accompanied by increases of similar magnitude in expenditures from extrabudgetary funds (Table 4). In all, 103 regular programme projects were completed in 1978.

12. Despite the substantial increase in the volume of technical assistance delivered, the sum of the unobligated earmarkings in respect of yet-to-be-implemented technical assistance also increased, from $4 million to $4.8 million. Although the backlog in the implementation of projects approved more than two years previously did increase somewhat, the positive trend in the delivery of assistance approved for the current year, which first became apparent in 1977, was sustained: the delivery percentage was 27% in 1976, 30% in 1977 and 36% in 1978.

13. It should be noted that earmarked funds equivalent in value to more than 40% of the unobligated balances reflect cases of scheduling of assistance over a number of years with the concurrence, and often at the specific request, of the Governments concerned; they do not reflect involuntary implementation delays.

14. It should also be noted that funds representing 72% of the unobligated balances are earmarked for expert services. A shortage of available experts in the necessary fields remains a major obstacle to further increases in the rate of implementation. The Agency counts on the continued willingness of Member States to make experts available. In fact, as the situation has worsened in recent years, there is an urgent need for redoubled efforts on the part of Governments to ensure that adequate numbers of qualified experts are made available.

15. At the same time, as already indicated in the report on the provision of technical assistance in 1977[3], the status and composition of the cash resources available to finance the regular programme make it imperative that the Agency proceed with the utmost caution in any attempt to increase the implementation rate much beyond its present level.

16. So far, fortunately, a deliberate slowing down of project delivery has been avoided, but the following paragraphs will make it clear why the cash liquidity situation for the various types of currencies available to finance the regular programme does not allow significantly greater increases in the implementation rate.

2. The status and composition of cash resources

17. As at 31 December 1978 total cash resources of $8 316 000 were available for the implementation of the regular programme, excluding the extrabudgetary funds contributed for regular programme projects. Against this amount a total of $8 271 000 has been earmarked for the provision of approved assistance; this sum consists of $3 470 000 in unliquidated obligations and $4 801 000 in unobligated earmarkings. A small reserve of $45 000, resulting from savings on completed projects, remains available for re-programming.

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[3] GC(XXII)/INF/177, paras 92-96.

It should be noted that, in the calculation of total earmarkings at the end of 1978, an increased pro-forma figure of $3800 per man-month of expert services has been used. On the basis of expenditure figures for expert services during January-July 1978, the 1979 regular programme pro-forma cost of an expert man-month was set at $3500, but an upward revision became necessary as a result of the expenditure pattern observed during the second half of 1978.

18. What on the surface appears to be an overall sound financial position rapidly changes when the currency composition of the resources and of the earmarkings is considered. The $8 316 000 available for expenditure at the end of 1978 consisted of $3 436 000 (or 41%) in selected non-convertible currencies (compared with 37% on 31 December 1977). At the same time, only $1 293 000 in these currencies ($840 000 in unliquidated obligations and $453 000 in earmarked funds) had been identified for assistance approved for the regular programme in 1978 and earlier years. Accordingly, when all the assistance in question has been provided, the equivalent of $2 143 000 in these non-convertible currencies will be left over.

19. The reason why measures to improve the implementation rate must be tempered with caution lies in the fact that the situation in respect of available convertible currencies is exactly the reverse of that described in the previous paragraph. Of the $8 316 000 in resources on hand as at 31 December 1978, only $4 880 000 was available in convertible currencies; on the other hand, assistance totalling $6 978 000 for which only convertible currency can be used had been approved. This means that, if all approved projects were to be fully implemented, there would be a cash deficit of $2 098 000 in convertible currencies.

20. The fact that the amount of unobligated holdings in non-convertible currencies against which no earmarkings can be made is at present $200 000 less than estimated in the 1977 report gives little relief. The increased magnitude of the problem is shown in the following table.

Comparison of available cash resources and programme commitments
as at 31 December 1977 and 1978
(in thousands of dollars)

	Total resources		Convertible currencies		Non-convertible currencies[a]	
	1977	1978	1977	1978	1977	1978
Available cash resources	7613	8316	4779	4880	2814	3436
Less: Programme commitments						
unliquidated obligations	3627	3470	2707	2630	920	840
unobligated earmarkings	4010	4801	3448	4348	562	453
Sub-total	7637	8271	6155	6978	1482	1293
Surplus: can be funded, or	-	45	-	-	1332	2143
Deficit: cannot be funded	(24)	-	(1356)	(2098)	-	-

a/ In this report the term "non-convertible currencies" refers to the accumulating currencies of Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Poland and the USSR.

21. It became clear during 1978 that new measures had to be taken in order to cope with this situation. As a result, the regular programme for 1979 submitted to the Technical Assistance Committee of the Board of Governors in December 1978 reflected for the first time a clear identification of assistance to be financed from each of the two types of currency resources expected to be available. Separate programming will better ensure that the trend towards a further increase in the precarious currency imbalance will not continue. This measure and the introduction of multi-year programming will also meet the request by the providers of non-convertible currencies for earlier notice of the type of assistance required, especially important in the case of equipment, and will allow forward planning on the supply side. The Member States in question have indicated that they are willing to accept payment in a number of annual instalments for large items of equipment that would be too costly to finance under the Agency's programme for any single year. This should enable the Agency to include several projects to be financed from non-convertible resources which could otherwise not have been accommodated.

22. Although, as stated, this new type of programming should prevent worsening of the currency-liquidity situation, it will not significantly reduce the existing imbalance. The balance can be redressed only if, for a number of years, new programme commitments in convertible currencies are kept below the anticipated new cash resources in those currencies. At the same time, it will of course be possible to absorb additional new commitments involving equivalent amounts in non-convertible currencies, so that the overall growth of the programme need not be affected.

3. Other developments

23. During 1978 programming missions were fielded to Costa Rica, Ecuador, Mali, Tanzania and Uruguay. In addition, a nuclear power programming mission visited Malaysia, advisory missions in the agricultural sector were sent to Indonesia, Malaysia, Pakistan and Sri Lanka and advisory missions in the radiological safety and environmental protection sector visited El Salvador and Niger. Mission reports and recommendations have been submitted to the Governments involved. While it is not the purpose of missions to impose overall priorities and programme strategies on Member States, they do aim at identifying areas where assistance in the application of nuclear techniques would be effective in achieving objectives the Governments have already set for specific sub-sectors or activities. They assist Governments in formulating concrete project proposals and requests for technical assistance in support of such objectives.

24. It has been encouraging to note that requests submitted by countries after visits by missions reflect the missions' recommendations. It is the intention of the Agency to continue to field programming missions and to intensify preparatory contacts with the countries to be visited. It is also essential that Governments make thorough preparations for the visits of missions since the ultimate aim of the programming missions is to assist national authorities in achieving coherence between national development plans and technical assistance requests relating to the sectors and techniques within the Agency's sphere of competence.

25. During 1978 a study was carried out with a view to advising on the replacement of the present computerized project status reporting system, which is outdated and completely inadequate. The resulting detailed proposal for a more adequate reporting system has meanwhile been approved by the Computer Steering Committee, and work on the gradual development and introduction of a revised system will start this year.

26. Under the present system, developed over ten years ago, the data for quarterly project status reports are collected from numerous sources, updated manually and then keypunched into cards. The effort required in producing a project status report is such that the information is often out of date by the time the report is issued. The system has no facilities for selecting specific sets of data or projects, nor is there any possibility to provide summary data. The system does not generate statistical data, it does not maintain a record of approved programme changes, and it is not possible to distinguish between types of currencies needed or usable for individual projects.

27. The rapid increase in the volume of the technical assistance handled, the growing complexities of the programme - involving multiple funds, different types of currencies and, from 1979 onwards, multi-year projects - make the existing system no longer viable; it has ceased to be an adequate monitoring and management tool. The new system will gradually replace the present form of project status reporting, so that accurate and up-to-date reports on all ongoing projects will be available to management.

28. The first phase, which will start in 1979, will cover regular programme projects. The second phase will deal with UNDP and special programme projects. With the completion of these phases, involving the most urgent tasks, the basis will have been created for a system which should then be expanded to include fellowship (phase 3) and training course information (phase 4). The initial period of adjustment will cause additional burdens on the Agency sections involved, but the ultimate advantages will far outweigh any temporary inconveniences. The new system will be developed in close co-operation with the Division of Budget and Finance and, when completed, will not only assist management but also enable the Agency to respond promptly to the increasingly frequent requests from Member States for detailed information, the presentation of the data being modified to meet the requester's requirements.

B. ASSISTANCE PROVIDED FROM EXTRABUDGETARY FUNDS AND THROUGH ASSISTANCE IN KIND

1. Extrabudgetary funds

29. Extrabudgetary funds are amounts donated by Member States over and above their voluntary contributions to the General Fund and are intended for specific projects indicated by the donor country. The extrabudgetary funds made available to the Agency for 1978 programmes increased to $2 926 000, an increase of 54% over the previous year. Technical assistance provided from extrabudgetary funds - including expenditures made against funds available from previous years - rose by 155%, from $602 400 to $1 539 200. The extrabudgetary funds made available for the 1978 programme year were received from the following donors:

Sweden	$1 570 700	Germany, F.R.	$60 300
USA	1 036 300	Japan	46 500
Canada	86 600	Australia	43 500
Belgium	61 500	Netherlands	20 100

30. In numerous cases the donations received included funds for multi-year projects; the portions received in 1978 for future-year activities will be reflected in the technical assistance reports for those years (see Table 5B). The importance of extrabudgetary funds is clearly demonstrated by the fact that in 1978 nearly 20% of the Agency's own technical assistance activities (excluding UNDP-financed assistance) could only be carried out thanks to these additional contributions. The substantial increase in these funds is therefore a most welcome development. At the same time, there are certain side effects connected with the administration of assistance financed from extrabudgetary funds which have some bearing on the programme as a whole.

31. All activities financed from these funds involve separate monitoring, accounting and reporting, and often require special handling during implementation. The amount of administrative manpower involved is, therefore, greater than for an equivalent volume of activities financed from the Agency's own funds.

32. As the additional contributions and the specific projects for which they are intended are not always known at the beginning of the programme year, some delays in implementation are often inevitable, in particular where the utilization of such funds is limited as regards sources of recruitment of experts and equipment procurement. The delay is less keenly felt at the recipient end when the project selected for support from extrabudgetary funds is a footnote a/ project, for the recipient country is aware that implementation of the project depends on the availability of additional resources. Once funds are received for such a project, the project becomes part of the total operational programme and a late start does influence the overall implementation rate for the given year.

33. Ideally, extrabudgetary funds donated in support of the regular programme should be concentrated exclusively on footnote a/ projects. Nevertheless, when earmarked for other than footnote a/ projects such funds can help to redress more quickly the existing imbalance between commitments and resources in the different types of currencies.

2. Assistance in kind

34. The assistance in kind made available to the Agency for 1978 amounted to $2 104 000, which represents an increase of about 28% over the in-kind resources, amounting to $1 648 000, made available for the programme in 1977. The assistance in kind actually provided through the Agency in 1978 was valued at $1 986 800, an increase of $702 500 (or 54%) over the $1 284 300 of assistance provided in 1977.

35. The bulk of the assistance was in support of one of the Agency's most important technical assistance activities - its fellowship and training course programme. During the last decade, training activities have accounted for 30% of the Agency's total technical assistance activities and this share remains fairly constant.

36. In addition to fellowships, and to cost-free and partly cost-free lecturers under assistance-in-kind arrangements, the training programme receives valuable assistance from countries which serve as hosts for Agency training courses. It should be stressed, however, that without such assistance the organization of Agency training courses would not be possible.

C. ASSISTANCE PROVIDED FROM UNDP FUNDS

1. Programme implementation

37. During 1978, 40 UNDP-assisted projects with a total 1978 budget of $4 398 810 were under implementation by the Agency. The UNDP funds approved for the full duration of these multi-year projects amount to $20 230 000, of which $9 764 000 had already been implemented prior to 1978. The value of the UNDP-financed assistance implemented rose from $2 144 400 in 1977 to $2 954 000, an increase of $809 600 or nearly 38%. UNDP assistance to nine new projects was approved for implementation by the Agency during 1978, with a total budget of $628 430.

38. As anticipated, the decline in UNDP assistance provided through the Agency ceased in 1977. The normalization of UNDP's financial situation in 1977 is reflected in the increase in expenditures during 1978. UNDP has in fact expressed renewed concern about the relatively low level of implementation attained by agencies in the United Nations system as a whole. Within the framework of tighter financial management, in order to avoid fluctuations of the type experienced late in 1975 UNDP - together with the executing agencies - is striving for more realistic project budgeting which will more closely reflect anticipated project implementation. Improved project budgeting will not only yield better implementation rates but also avoid the unnecessary tying-up of resources.

39. Plans for several new large-scale projects in fields where the Agency is competent were being formulated during 1978 and will be ready for implementation this year. The situation as regards future UNDP-assisted projects is encouraging. However, following the already established pattern, the bulk of these new large-scale projects is concentrated in Latin America, which gives some reason for concern regarding the workload-staffing situation in the Latin America Section of the Division of Technical Assistance. To cover the cost of the implementation of UNDP-funded assistance in 1978, the Agency has received $853 184 in programme support money from UNDP. At the Agency's request, UNDP has agreed to apply to the Agency the "flexibility arrangements" under which higher programme support costs are payable to small agencies. The amount just mentioned is considerably higher than the standard 14% received in previous years.

2. Other developments

40. UNDP is continuing its efforts to create a true sense of partnership between it and all the agencies in the United Nations system involved in its technical co-operation programme. Although the smaller agencies, including the IAEA, are not in a position to participate full-time in the work of the Inter-Agency Task Force established at UNDP Headquarters for the purpose of ensuring common approaches to technical co-operation problems, they are kept informed of all issues being studied by the Task Force and are given every opportunity to make their views known on any subject it deals with.

41. UNDP position papers on major issues are not only circulated in draft form to agencies for comment before their finalization but are also discussed at various UNDP-organized inter-agency meetings. Responses to Joint Inspection Unit studies, and also major studies on key issues and ad hoc reports requested by UNDP's Governing Council, are formulated after detailed consultation with agencies, so that the final documentation reflects as much as possible the views of the United Nations system as a whole.

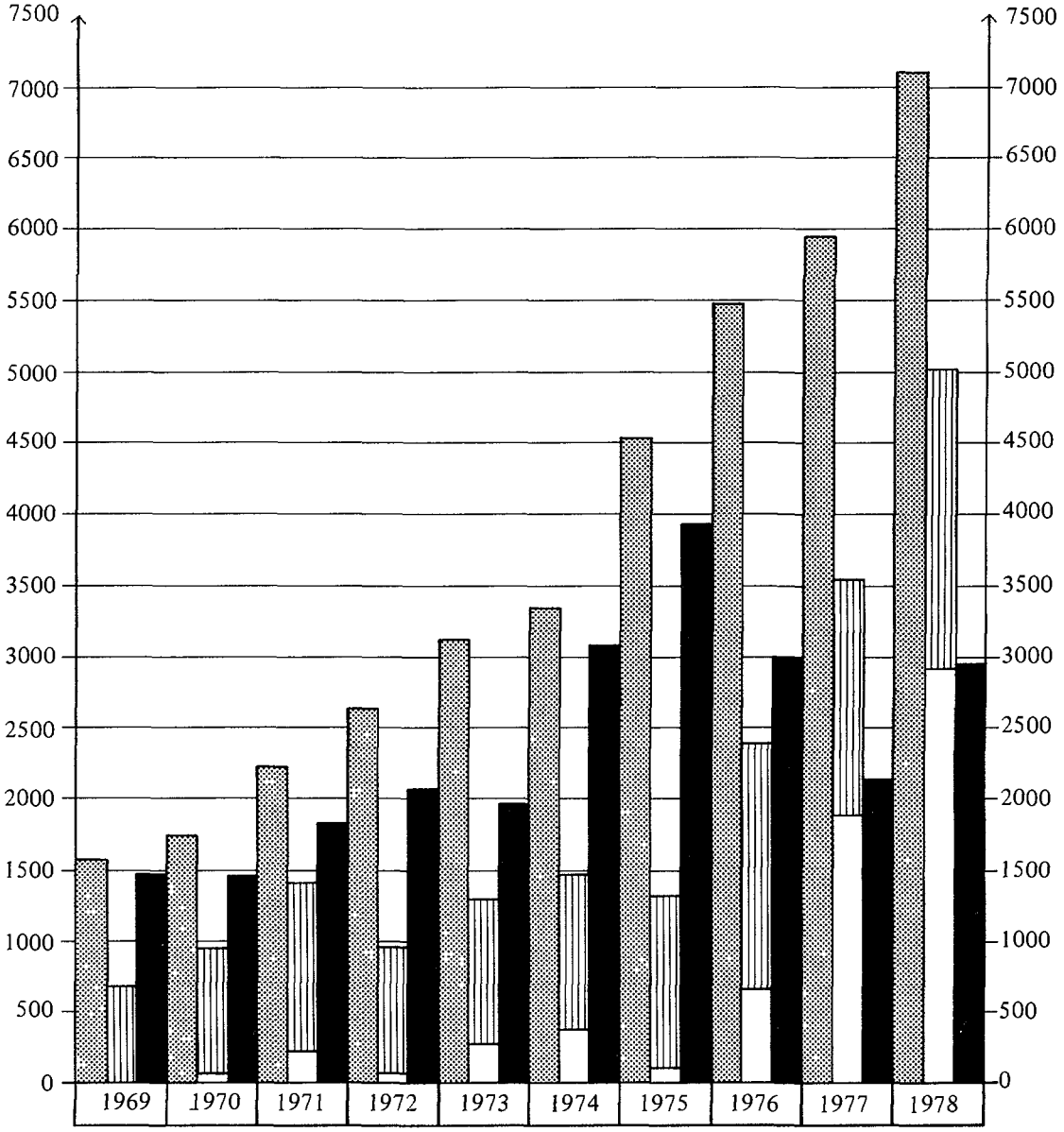
42. In view of the Agency's limited staff resources, it is not always possible for the Agency to avail itself fully of the opportunity UNDP provides for contributing to such studies. At times, requests for contributions to the various recurring and ad hoc reports being prepared for the UNDP Governing Council or implicit in resolutions of other United Nations organs become a heavy burden even for the larger agencies. Nevertheless, the spirit and extent of co-operation with executing agencies and UNDP's efforts to ensure that the experience of all concerned is brought to bear on new UNDP programme concepts and directions are extremely valuable.

43. The trend towards greater co-ordination of all technical co-operation activities of the United Nations system will be strengthened as a result of the recent restructuring of the economic and social sectors of the United Nations system and the appointment of a Director General for Development and International Economic Co-operation. UNDP/executing agency meetings on technical co-operation matters will be convened in future by a newly created subsidiary committee of the Administrative Committee on Co-ordination (ACC) - namely, the Consultative Committee on Substantive Questions (CCSQ), of which the operational component CCSQ (OPS) will take up such items as the analysis of operational programmes, the integration of United Nations system-supported activities at the country level and other issues of system-wide concern arising in connection with UNDP and other voluntary fund operations.

44. In line with General Assembly resolution 32/197 on the restructuring of the economic and social sectors of the United Nations system and with General Assembly resolution 2688 (XXV), UNDP will this year initiate further consultations with the executing agencies on how best to utilize the country programming process as a frame of reference for the operational activities carried out and financed by the organizations in the United Nations system from their own resources. This subject was also one of the main items discussed at the first meeting of CCSQ (OPS), in April 1979.

FIGURE 1

RESOURCES AVAILABLE FOR
AGENCY TECHNICAL ASSISTANCE PROGRAMMES: 1969–1978
(in thousands of dollars)



	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Agency funds	1586	1749	2225	2637	3125	3348	4539	5492	5961	7116
Extrabudgetary funds	13	61	218	60	267	367	110	648	1899	2926
Assistance in kind	658	894	1197	900	1032	1114	1212	1737	1648	2104
UNDP funds	1484	1469	1839	2072	1964	3082	3942	3002	2144	2954
TOTAL	3741	4173	5479	5668	6388	7911	9803	10879	11652	15100

Agency funds Extrabudgetary funds Assistance in kind UNDP funds

Part III. ANALYSIS OF THE ASSISTANCE PROVIDED

A. AVAILABLE RESOURCES

1. General

45. The resources available to the Agency in 1978 for the provision of technical assistance amounted to $15 100 000 (see Figure 1 and Table 1), which is 29.6% higher than the figure for 1977 ($11 652 000) and is made up as follows:

(a) UNDP, $2 954 000 in cash;

(b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, $7 116 000;

(c) Extrabudgetary funds, $2 926 000, for the provision of expert services, equipment and fellowship training; and

(d) Gifts in kind (services of cost-free and partly cost-free experts and lecturers, Type II fellowships, and funds to defray the expenses of scientific visitors) valued at $2 104 000.

2. UNDP

46. To the total of $2 954 000 spent by the Agency in carrying out the UNDP field programme in 1978 ($36 500 for assistance to intercountry projects and $2 917 500 for assistance to country programme projects) $942 500 - the unliquidated obligations carried forward to 1979 (the comparable figure a year ago was $691 900) - should be added for a clearer picture of the total UNDP resources at the Agency's disposal in 1978.

3. The Agency's regular programme

47. As at 31 December 1978 the pledges of voluntary contributions to the General Fund for 1978 had reached 92.1% of the target figure of $7 million (the largest amount pledged in any year to date), as compared with 90.8% of the $6 million target figure in respect of 1977. Member States' pledges ($6 446 500, as compared with $5 448 000 for 1977) were reflected in the income of Operating Fund II (totalling $7 230 000 from all sources for 1978, as compared with $5 961 000 for 1977), from which the regular programme is financed. Additional information is given in Annex V.

4. Extrabudgetary funds

48. As can be seen in paragraph 45(c), extrabudgetary funds totalling $2 926 000 were made available in 1978 for the provision of technical assistance, as compared with $1 899 000 in 1977, which represents an increase of 54%. Prior to 1977 the assistance financed from these funds was included in the totals for assistance provided in kind, due to the relatively low volume involved. The receipt in 1977 of three special cash contributions totalling almost $2 million made it desirable to establish a separate category in these annual reports so that such funds could be more accurately accounted for. Additional information is given in Tables 1, 4, 5B, 7 and 8 and also in Annex II.A.

5. Gifts in kind

49. The estimated value of the assistance in kind made available for 1978 programmes was $2 104 400, which is about 28% higher than the figure of $1 647 700 for 1977. The composition of the gifts in kind was as follows: cost-free and partly cost-free expert services,

$206 200 ($82 400 in 1977); training, $1 898 200 ($1 489 500 in 1977, consisting of training course and Type II fellowship stipends and funds for scientific visitors)[4]. There were no equipment grants in 1978 ($75 800 in 1977), but some equipment was provided by the United States of America in 1978 as a result of offers made in previous years (see Annex II.C).

50. Host country contributions: The assistance provided by the Agency often involves a much larger financial commitment on the part of the recipient countries than can be reflected in the financial statistics in a report like this, as the value of the counterpart staff and facilities made available by Governments is difficult to assess. The value represented by the lecturers and other facilities made available by a Government which hosts a regional or interregional training project (see Annex III) is also not reflected herein. In this connection, special credit is due to France, the Federal Republic of Germany, Spain and the United States of America for the valuable assistance they rendered in preparing and carrying out the training courses relating to nuclear power projects which were held in 1978.

6. Funds in trust

51. Assistance valued at $92 600 was provided by the Agency under funds-in-trust arrangements with five developing countries in 1978 (see Annex II.B).

7. Use of resources

52. The total value of the technical assistance being provided by the Agency exceeded $19.8 million in 1978 (the figure for 1977 was $15.4 million); it consisted of $13 007 500 in assistance provided and $6 812 500 in unliquidated obligations and assistance in kind in the process of being provided but still outstanding at the end of the year. The value of the assistance actually delivered in 1978 exceeded by $3 979 300, or 44%, that of the assistance delivered in 1977. The breakdown of the total of unliquidated obligations and assistance in kind outstanding at 31 December 1978 is as follows: $689 800 for expert services, $2 333 100 for equipment and supplies and $3 789 600 for fellowships.

53. As in earlier years, regular programme expenditures and unliquidated obligations at the end of 1978 exceeded the cash resources in respect of that year's regular programme due to the fact that the former include expenditures and obligations met from funds carried over in respect of assistance being provided under the regular programme for 1977 and prior years. The type and estimated value of the assistance in kind provided through the Agency in 1978 is given - by donor - in Annex II, which also gives information on assistance to 1977 and 1978 regular programme projects financed from special cash contributions.

B. DISTRIBUTION OF ASSISTANCE

1. By field of activity

54. A 1977:1978 comparison is given below of the amount of assistance provided in what were the five main fields of activity in 1978. Numerical data for all ten fields of activity are given in Figures 2A, 3A and 4A (which include comparable data for 1977) and in Figure 5A.

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[4] Additional information is given in Annex V on Type II fellowships made available to the Agency.

Assistance by field of activity and type: 1977 and 1978
(in thousands of dollars)

Field of activity	Year	Experts	Equipment	Fellowships	Share of total programme	
		$	$	$	$	%
Application of isotopes and radiation in agriculture	1977	737.7	525.9	529.0	1792.6	19.9
	1978	827.4	1066.2	550.2	2443.8	18.8
Nuclear engineering and technology	1977	508.2	573.1	891.4	1972.7	21.8
	1978	574.2	812.4	976.0	2362.6	18.2
General atomic energy development	1977	320.9	208.9	93.6	623.4	6.9
	1978	474.5	766.3	242.6	1483.4	11.4
Nuclear physics	1977	313.2	250.9	194.5	758.6	8.4
	1978	337.1	649.5	461.5	1448.1	11.1
Prospecting, mining and processing of nuclear materials	1977	696.0	239.2	155.7	1090.9	12.1
	1978	663.8	539.7	209.4	1412.9	10.9
Total	1977	2576.0	1798.0	1864.2	6238.2	69.1
	1978	2877.0	3834.1	2439.7	9150.8	70.4
Total assistance	1977	3275.6	3048.7	2703.9	9028.2	100.0
	1978	3884.3	5458.2	3665.0	13007.5	100.0

2. By region and country

55. Information on the distribution of technical assistance by region is summarized in Figures 5A and 5B. As in each of the years 1970-1978, more countries in Africa - namely, 21 - received Agency assistance than in any other region; 19 States in Latin America and 16 in Asia and the Pacific region received country programme assistance from the Agency in 1978, followed by Europe and the Middle East with 13 and 6 country programme recipients respectively. Two additional countries - one in Asia and the Pacific region and one in the Middle East - participated in the Agency's programme of intercountry short-term training projects, but they did not receive country programme assistance.

56. In 1978, 77 countries received technical assistance from the Agency, as compared with 73 countries and one regional organization in 1977. Including those which acted as hosts for short-term training projects and scientific visits, 34 countries both received and provided assistance (27 in 1977); 22 countries provided but did not receive technical assistance in 1978 (22 in 1977), and 43 countries were recipients only (46 in 1977). Thus 99 countries (95 in 1977) participated in the Agency's technical assistance programme in 1978. Figures 2B, 3B and 4B and Table 3 show the extent to which skills and knowledge were exchanged between countries. The data relate also to Agency staff members and representatives of four other international organizations who served as experts or lecturers in 1978 and are shown in Figure 2B by nationality.

3. By type of assistance

57. The distribution, by type, of technical assistance in 1977, 1978 and over the period 1969-1978 was as follows:

Type	1977		1978		1969-1978	
	%	$1000	%	$1000	%	$1000
Experts	36.3	3275.6	29.9	3884.3	33.7	23 455.1
Equipment	33.8	3048.7	41.9	5458.2	36.4	25 305.5
Fellowships	29.9	2703.9	28.2	3665.0	29.9	20 765.5
Total	100.0	9028.2	100.0	13007.5	100.0	69 526.1

(a) Experts, lecturers and visiting professors

58. In 1978, 441 experts, lecturers and visiting professors from 44 countries and five international organizations served a total of 918 man-months at a cost of $3 884 300; the comparable data for 1977 are: 389 experts, lecturers and visiting professors from 35 countries and six international organizations, who provided 878 man-months of assistance at a cost of $3 275 600. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1978 totalled $698 800 for expert services. A total of 62 countries (also 62 in 1977) were served by 256 country programme experts and visiting professors (217 in 1977), and an additional 185 experts and lecturers (172 in 1977) assisted 23 intercountry projects (69 partly cost-free and 36 cost-free experts and lecturers were provided, as compared with 47 partly cost-free and 19 cost-free experts and lecturers in 1977). Experts' final reports and similar reports which became available in 1978 are listed in Annex IV.

(b) Equipment and supplies

59. Including the value of grants of equipment delivered during 1978, 64 countries and 20 intercountry projects (58 and 12 respectively in 1977) were provided with equipment and supplies to the value of $5 458 200, which represents an increase of about 80% compared with the amount of $3 048 700 provided in 1977. An additional amount of equipment and supplies valued at $2 333 100 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 and 7.

60. As in previous years, the need to spread the purchase of technical assistance equipment and supplies over a large number of Member States continued to be recognized. In 1978, such items were procured in 24 countries (the same number as in 1977), as shown in Figure 3B, which also includes financial data in respect of equipment grants.

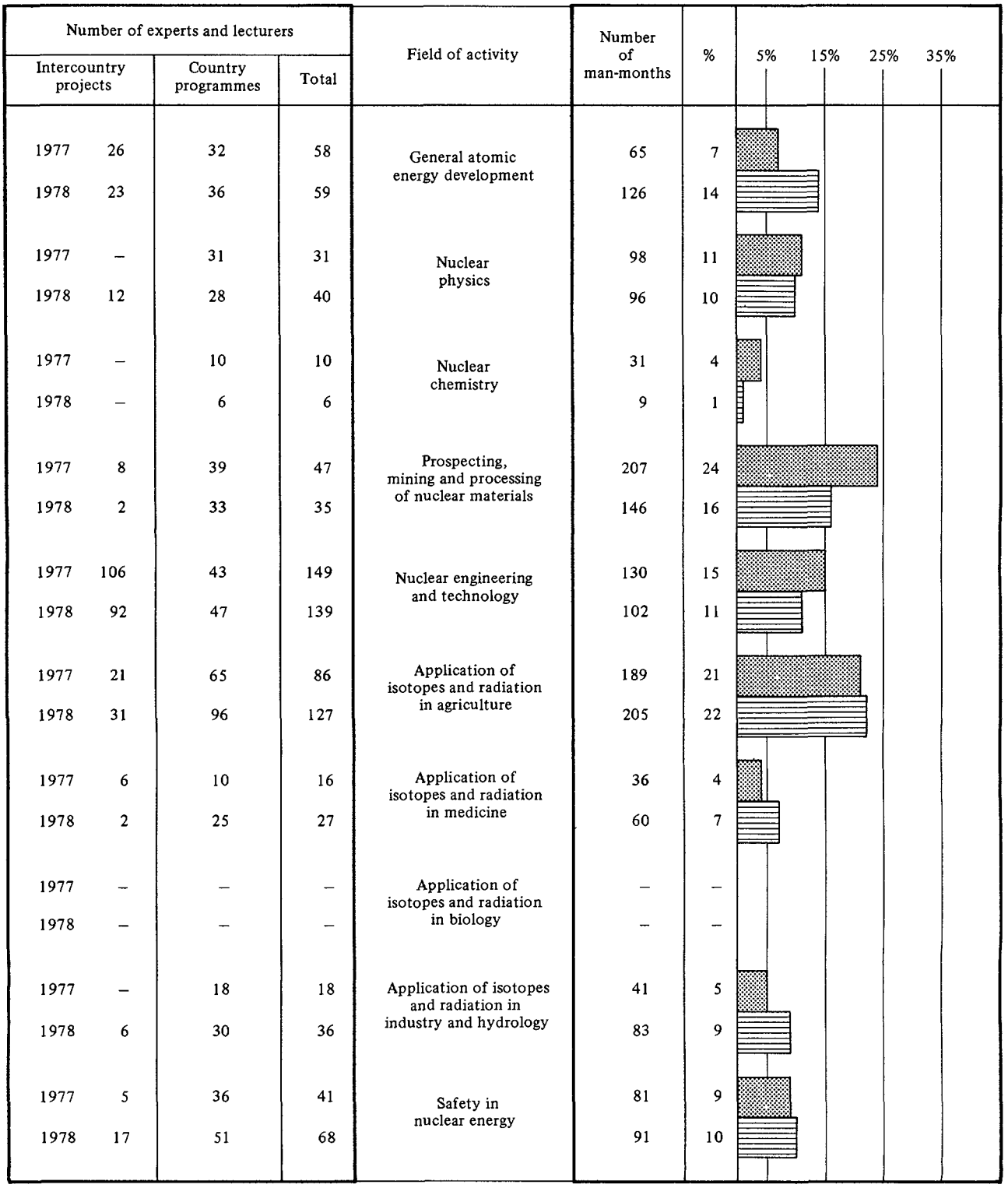
(c) Training

61. A total of 900 candidates from 68 countries received awards under the training programme in 1978 (see Figure 4B and Tables 3 and 6), as against 828 candidates from 60 countries and a regional organization in 1977. The number of man-months of training awarded was 3925 in 1978, as against 4265 in 1977. The higher number of training award holders in 1978 was due mainly to increases in the number of awards for participation in short-term training projects (450 awards in 1978 and 364 in 1977).

FIGURE 2A

DISTRIBUTION OF EXPERT SERVICES BY FIELD OF ACTIVITY: 1977 and 1978

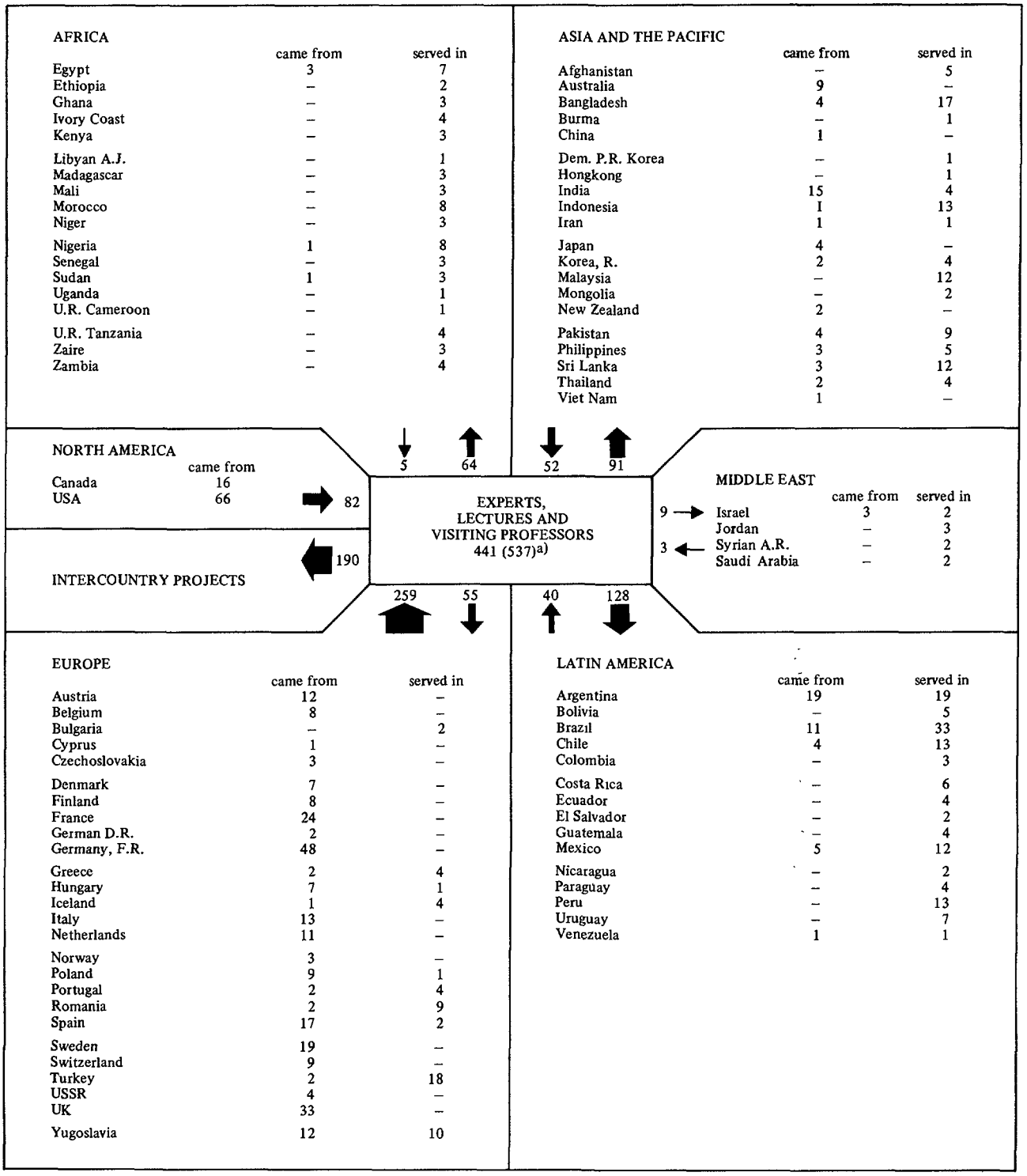
Number of experts and lecturers				Field of activity	Number of man-months	%
Intercountry projects		Country programmes	Total			
1977	26	32	58	General atomic energy development	65	7
1978	23	36	59		126	14
1977	–	31	31	Nuclear physics	98	11
1978	12	28	40		96	10
1977	–	10	10	Nuclear chemistry	31	4
1978	–	6	6		9	1
1977	8	39	47	Prospecting, mining and processing of nuclear materials	207	24
1978	2	33	35		146	16
1977	106	43	149	Nuclear engineering and technology	130	15
1978	92	47	139		102	11
1977	21	65	86	Application of isotopes and radiation in agriculture	189	21
1978	31	96	127		205	22
1977	6	10	16	Application of isotopes and radiation in medicine	36	4
1978	2	25	27		60	7
1977	–	–	–	Application of isotopes and radiation in biology	–	–
1978	–	–	–		–	–
1977	–	18	18	Application of isotopes and radiation in industry and hydrology	41	5
1978	6	30	36		83	9
1977	5	36	41	Safety in nuclear energy	81	9
1978	17	51	68		91	10



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

FIGURE 2B

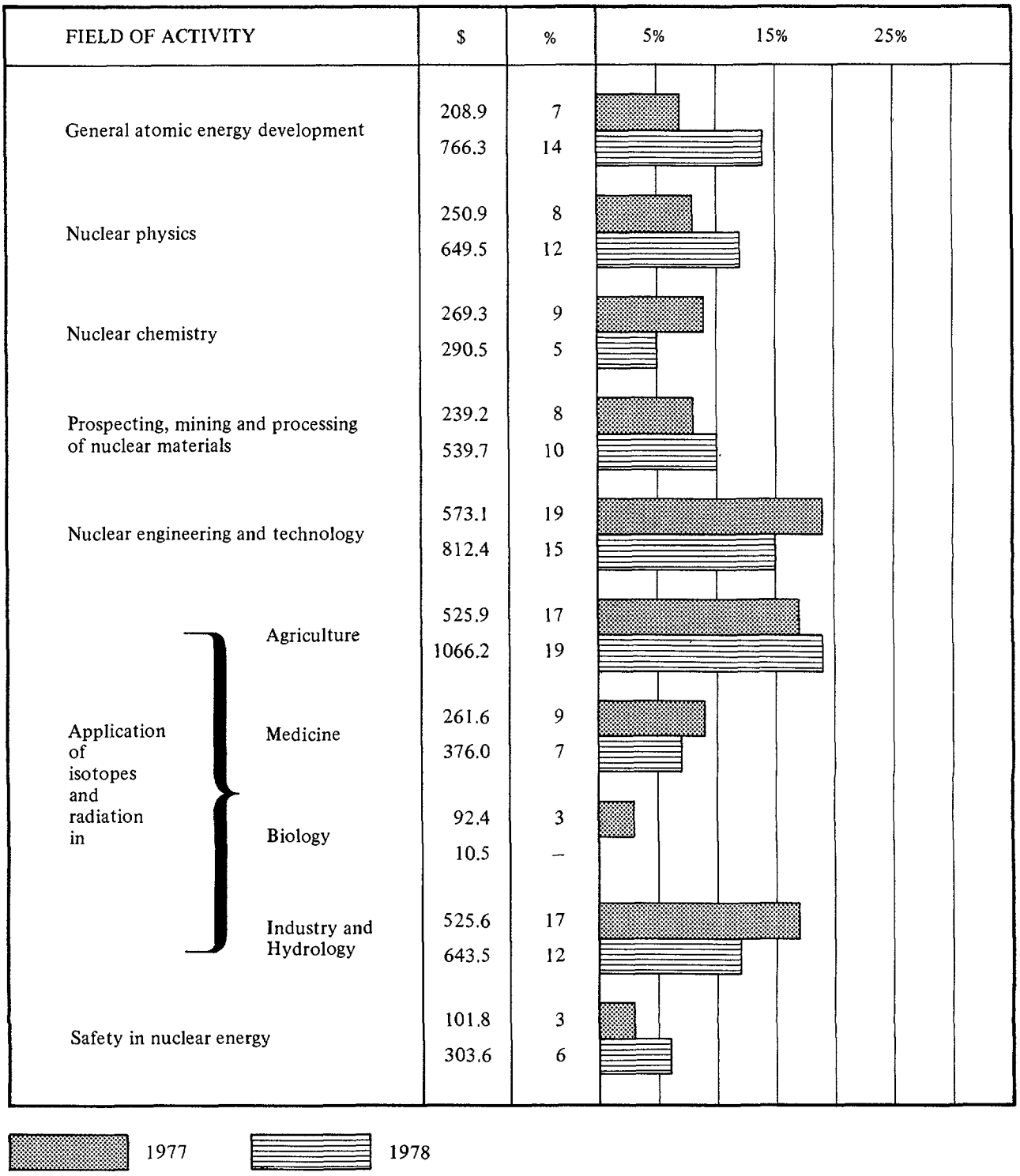
DISTRIBUTION OF EXPERT SERVICES BY REGION: 1978



a) The difference between the number of assignments (537) and the actual number of experts (441) is due to the fact that a number of experts served in more than one country.

FIGURE 3A

DISTRIBUTION OF EQUIPMENT BY FIELD OF ACTIVITY: 1977 and 1978
(in thousands of dollars)



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

FIGURE 3B

DISTRIBUTION OF EQUIPMENT BY REGION: 1978
(in thousands of dollars)

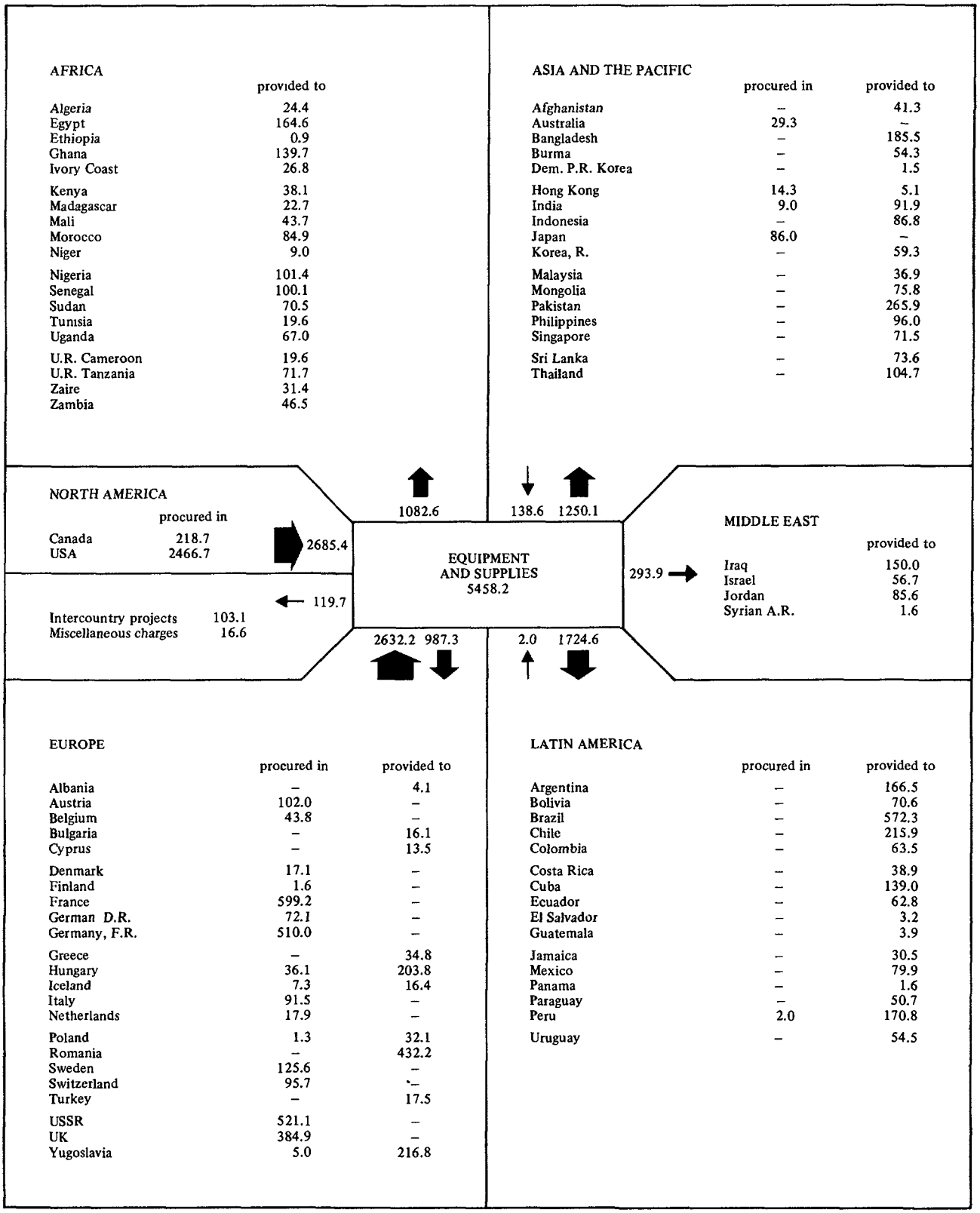
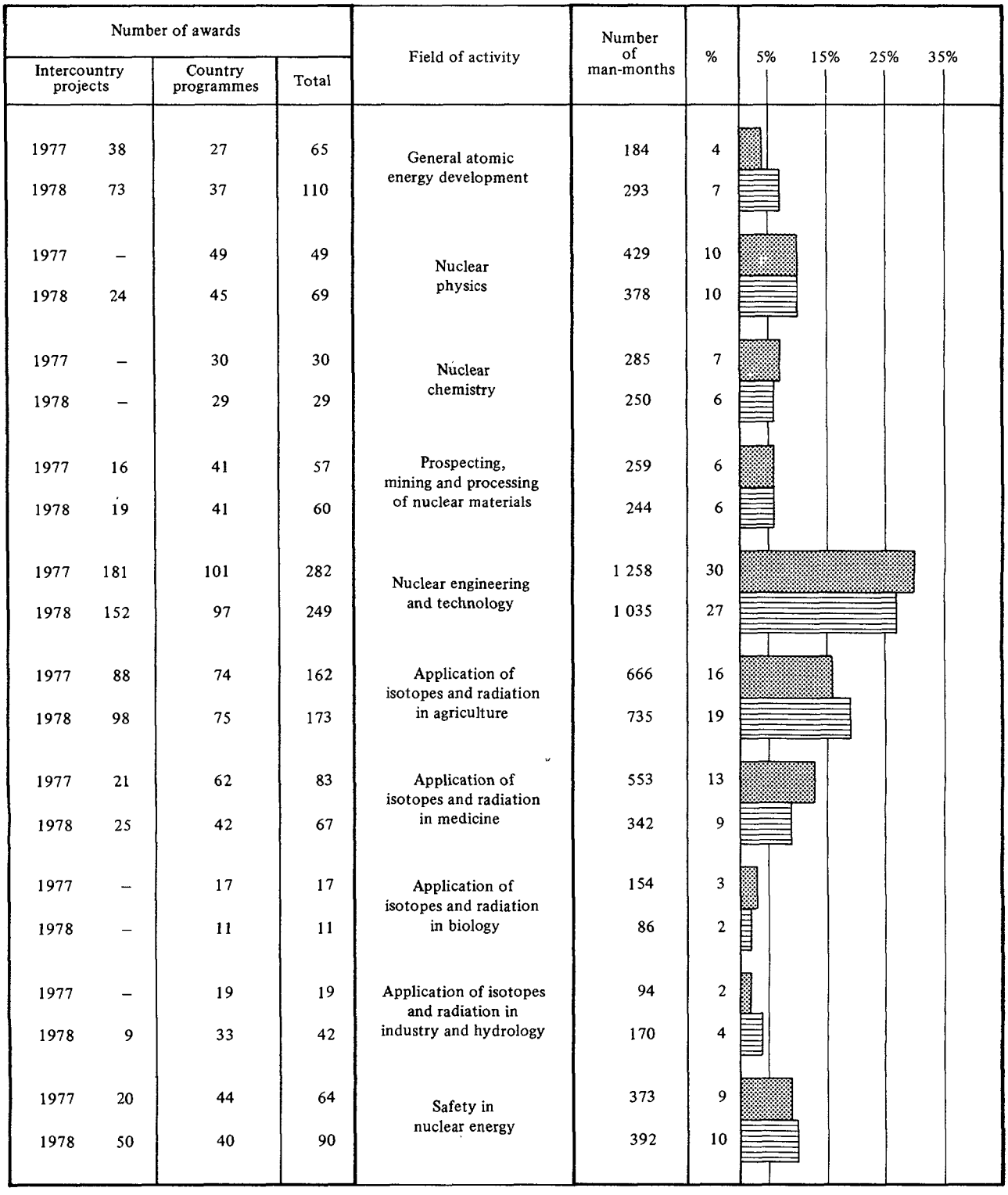


FIGURE 4A

DISTRIBUTION OF FELLOWSHIP AWARDS BY FIELD OF ACTIVITY: 1977 and 1978

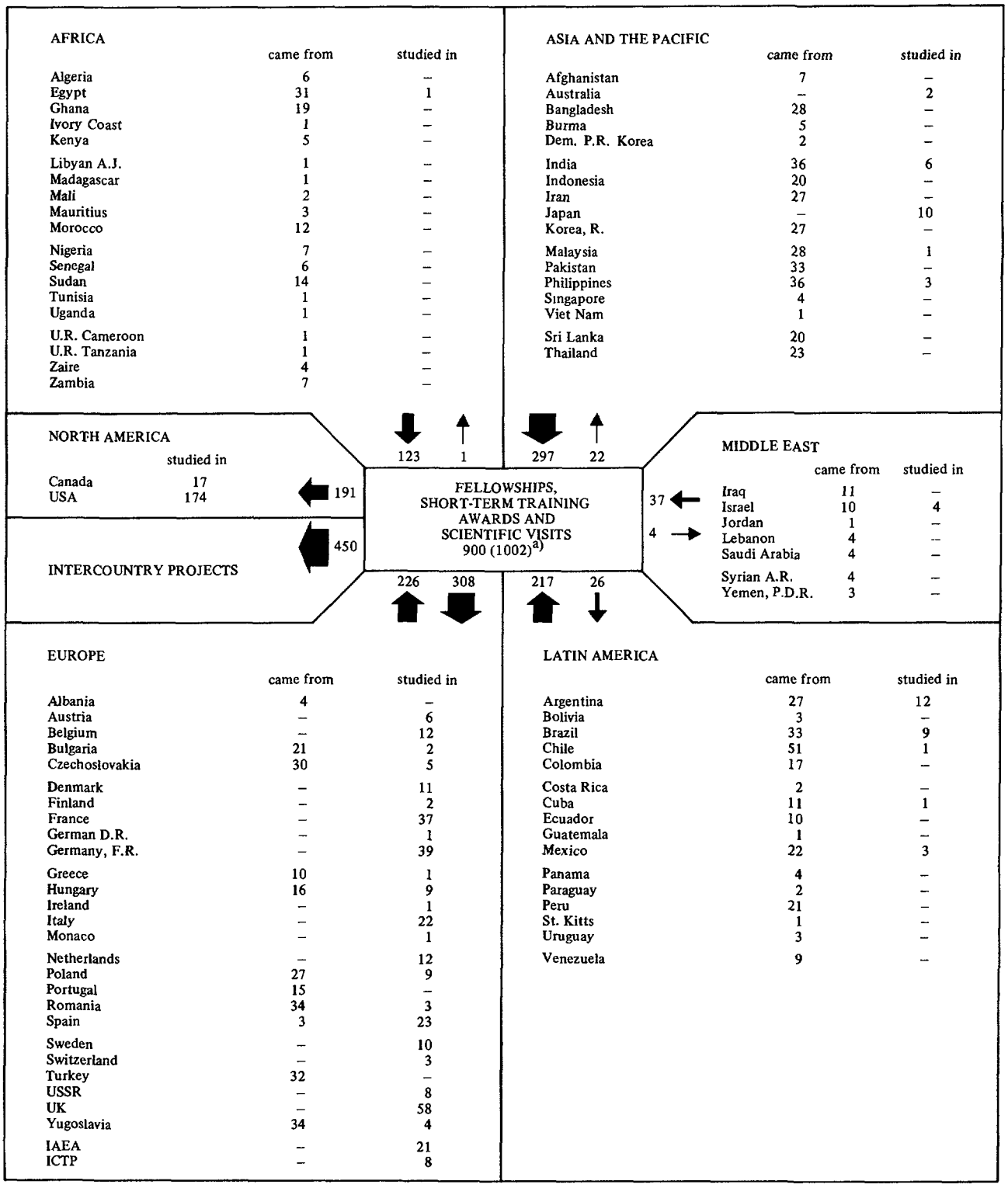
Number of awards				Field of activity	Number of man-months	%
Intercountry projects		Country programmes	Total			
1977	38	27	65	General atomic energy development	184	4
1978	73	37	110		293	7
1977	–	49	49	Nuclear physics	429	10
1978	24	45	69		378	10
1977	–	30	30	Nuclear chemistry	285	7
1978	–	29	29		250	6
1977	16	41	57	Prospecting, mining and processing of nuclear materials	259	6
1978	19	41	60		244	6
1977	181	101	282	Nuclear engineering and technology	1 258	30
1978	152	97	249		1 035	27
1977	88	74	162	Application of isotopes and radiation in agriculture	666	16
1978	98	75	173		735	19
1977	21	62	83	Application of isotopes and radiation in medicine	553	13
1978	25	42	67		342	9
1977	–	17	17	Application of isotopes and radiation in biology	154	3
1978	–	11	11		86	2
1977	–	19	19	Application of isotopes and radiation in industry and hydrology	94	2
1978	9	33	42		170	4
1977	20	44	64	Safety in nuclear energy	373	9
1978	50	40	90		392	10



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

FIGURE 4B

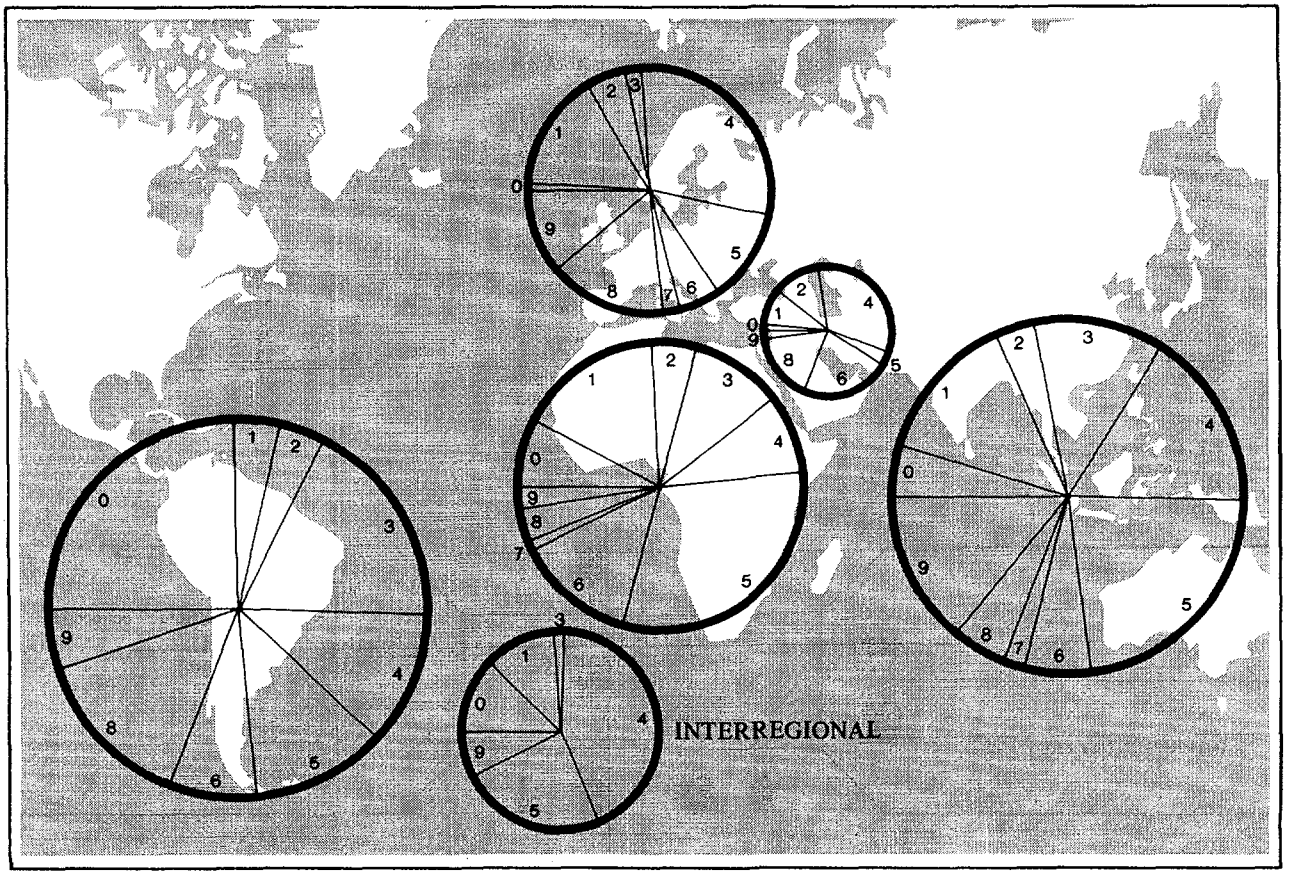
DISTRIBUTION OF FELLOWSHIP AWARDS BY REGION: 1978



a) The difference between the number of awards (900) and the number of places of study (1002) is due to the fact that a number of fellows, study tour participants and holders of awards for scientific visits went to more than one place of study.

FIGURE 5A

DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD AND REGION: 1978 [a/]



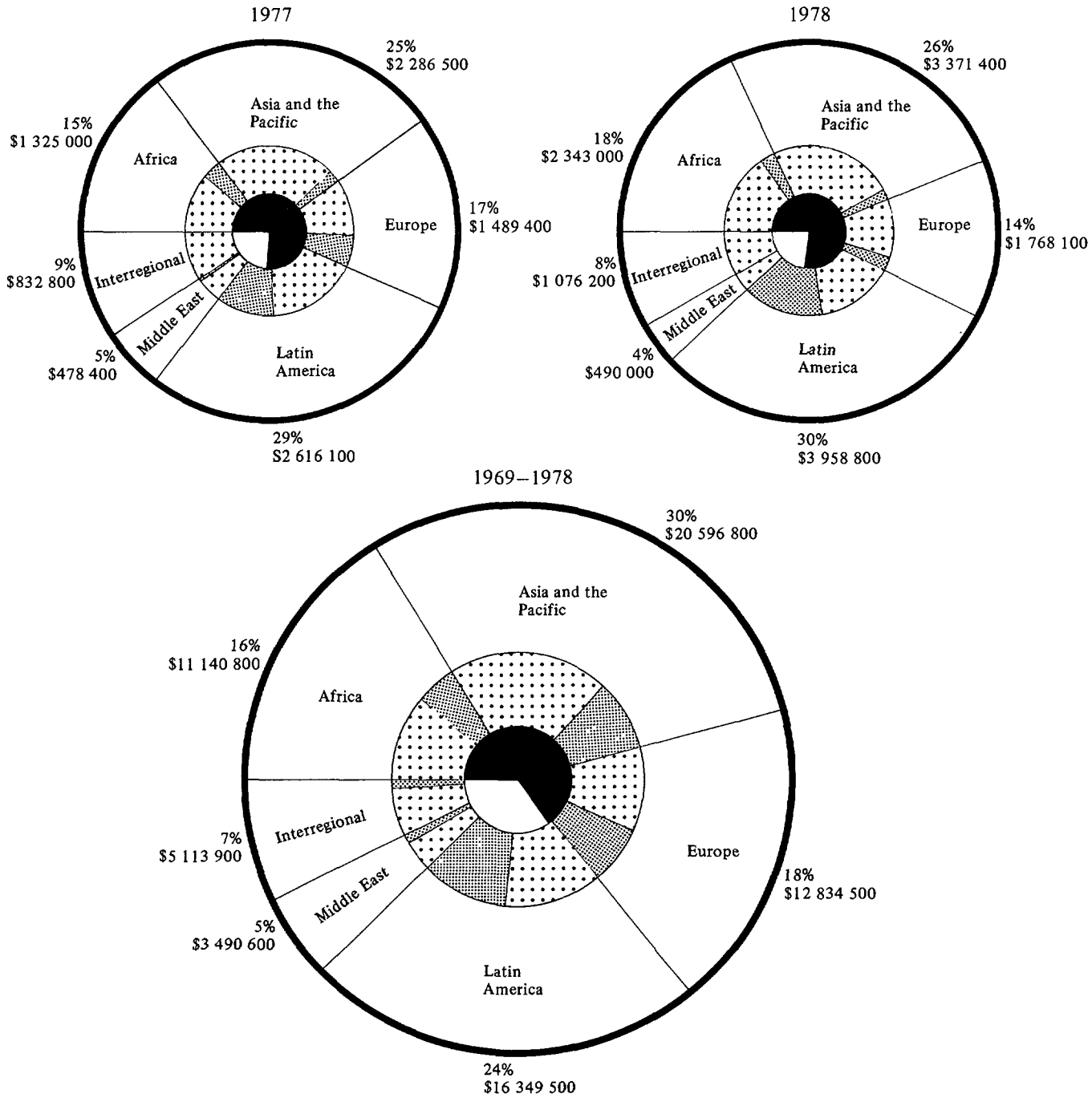
SUMMARY

Field of activity	Africa %	Asia and the Pacific %	Europe %	Latin America %	Middle East %	Inter-regional %	All regions %
0 - General atomic energy development	8	5	1	25	1	12	11
1 - Nuclear physics	17	13	16	4	9	12	11
2 - Nuclear chemistry	5	4	5	4	12	–	4
3 - Prospecting, mining and processing of nuclear materials	10	12	2	18	–	2	11
4 - Nuclear engineering and technology	9	16	30	11	33	43	18
Application of isotopes and radiation in: 5 - Agriculture	31	23	12	12	3	24	19
6 - Medicine	13	6	5	7	23	–	8
7 - Biology	1	2	2	–	–	–	1
8 - Industry and Hydrology	4	5	16	14	17	–	9
9 - Safety in nuclear energy	2	14	11	5	2	7	8
	100%	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
(1977, 1978 and 1969–1978)

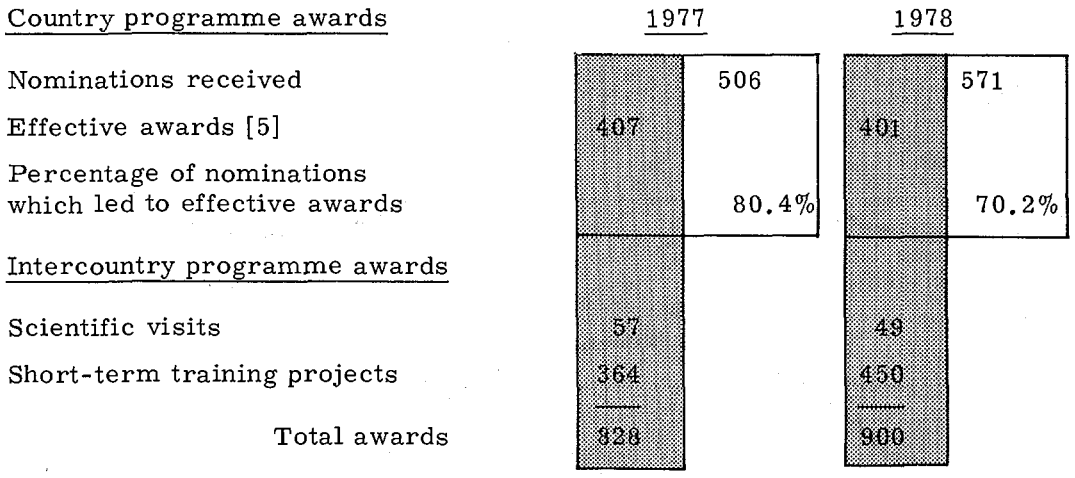


LEGEND (distribution of technical assistance by source):

INNER RING	(region distribution)	INNER CIRCLE	(overall distribution)	1977	1978	1969-1978
	Agency resources		Agency resources	76.2%	77.3%	65.3%
	UNDP		UNDP	23.8%	22.7%	34.7%

62. Due to the large number of holders of fellowship awards under prior years' programmes who studied in 1978, the value of the training provided by the Agency in 1978 is the highest on record for any one year - namely, $3 665 000, as compared with $2 703 900 in 1977. The 1978 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 1978, amounting to $3 789 600; this amount is $826 000 higher than the combined total of these two items at the end of 1977 and holds promise of a training programme amounting to about $4 200 000 in 1979.

63. A comparison of the nominations and awards for country programme fellowships in 1977 and 1978 and of all training awards made during these two years is given below. The number of country programme and scientific visit awards decreased (the latter by 14%), whereas the number of awards in connection with short-term training projects increased by about 24%.



64. The percentage of fellowship nominations which led to effective country programme awards in 1978 - namely, 70.2% - is the lowest observed during the past five years but is only slightly lower than the ten-year average. Numerous candidates were not selected because they were under- or over-qualified for the training requested, their knowledge of the foreign language in which the training abroad would have been given was not satisfactory, the training requested was not related to the peaceful application of nuclear energy, or their candidature was withdrawn and they were therefore not available to take up fellowship awards.

65. In 1978 the Agency conducted 22 intercountry training projects in 13 different countries, with 501 participants from 60 different countries. The cost of attendance of 450 participants from 58 countries was paid out of project funds (Agency resources and UNDP funds); the cost of attendance of 51 participants, including 18 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 450 awards financed from Agency resources and UNDP funds.

66. Nine of the 22 intercountry training projects related to nuclear power development; in addition, there were six projects in the use of nuclear techniques in food and agriculture, one project in nuclear electronics, one in uranium exploration and evaluation, one in medicine, one in industry, one in calibration methods for radiation-measuring devices, one in radiological protection and waste management, and one in the use of neutron generators. Further details on the location, attendance, financing, etc. of these projects are given in Annex III.

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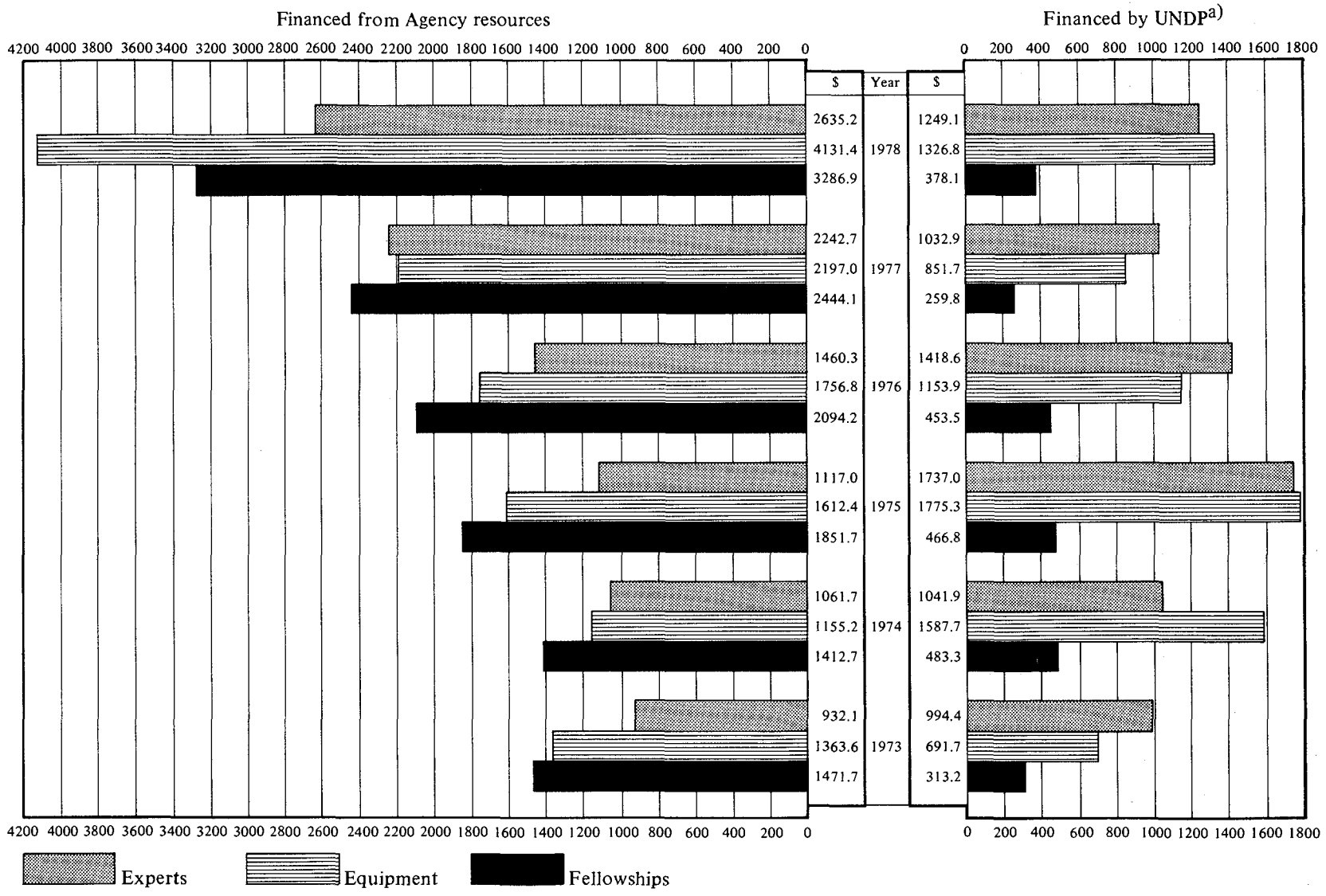
[5] Total number of awards less withdrawals after granting of the award as at 31 December 1977 and 31 December 1978 respectively.

FIGURE 6

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



a) Includes the value of assistance in kind made available for UNDP-assisted projects 1973–1976.

(d) Regional activities

67. Under the 1978 regular programme 28 man-months of expert services were approved for a survey, to be made in the region of Asia and the Pacific, of the potential for the introduction of radioisotope techniques in local industry. Two four-man missions visited Bangladesh, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka and Thailand. Five outside specialists - from Australia, Denmark, India, Japan and the United States - participated in the survey, which revealed numerous opportunities for innovative uses of nuclear techniques which could make an early economic impact, strengthen existing infrastructures and promote regional co-operation. A proposal requesting large-scale follow-up assistance has been submitted for UNDP's consideration.

(e) Follow-up missions

68. In 1978, in addition to the programming missions, six one-man missions were sent in order to determine needs and discuss development plans with requesting countries; 15 countries were visited.

Part IV. SOME SELECTED AREAS OF TECHNICAL CO-OPERATION

69. As in earlier reports on the provision of technical assistance by the Agency,[6] details are given below regarding some areas of technical co-operation of interest to Governments (quality assurance for nuclear power projects and radiosterilization of medical supplies), followed by information concerning the Agency's fellowship programme and some selected projects assisted under the regular programme, by UNDP and from extrabudgetary funds.

A. QUALITY ASSURANCE FOR NUCLEAR POWER PROJECTS

70. In the last five reports information was given on the assistance available from the Agency to developing countries which are considering the introduction of nuclear power.[7] The purpose of highlighting the critical areas of a nuclear power programme is to enable Governments to become more fully aware of what is involved with regard to costs, tasks and planning needs to obtain a reliable and safe source of electricity.

71. During the past 50 years, industry has placed increasing emphasis on improving the reliability and safety of machines and systems because such improvements have resulted in increased productive capacity and lower costs. Industry-wide standards and norms were introduced governing, for example, the specifications that had to be met for steam boilers and soon gauges and other measuring devices came into use so that process parameters such as steam pressure could be monitored visually and/or automatically recorded. The advent of automation, advances in electronics, and new materials with a wide range of improved characteristics have paved the way for today's technological revolution.

72. The shift towards achieving a higher level of safety and quality in industry, where serious accidents still occur, is difficult to compare with the nuclear power industry, where safety is the prime consideration. In industry, certain processes are closely scrutinized to ensure that the manufactured products meet special standards. In the nuclear industry, however, the standards established to ensure safety are much more exacting and pervade every activity connected with a nuclear power project.

73. As the operation of a nuclear power plant is associated with certain risks, plant design, construction and operation are subject to stringent control - which is exercised by national regulatory organizations in all Agency Member States that have an active nuclear power programme. The function of such an organization is the establishment, implementation and enforcement of safety criteria and standards in respect of all phases of a nuclear power project. The enforcement of these criteria and standards in the design, construction, commissioning and operation of a nuclear power plant establishes confidence that, because of its reliability and safety, a plant will have no adverse effects on human life, health or the environment.

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[6] See, for example, document GC(XIX)/INF/154, containing information in paras 24-38 on the use of nuclear techniques in industry and hydrology, GC(XX)/INF/161, which contains, in addition to other topics, information in paras 24-30 on technician training, GC(XXI)/INF/169, which provides information in paras 33-37 on the medical use of in vitro assay procedures with radioactive agents, and GC(XXII)/INF/177, containing information in paras 31-48 on the application of isotopes and radiation in agriculture.

[7] GC(XVIII)/INF/148, paras 24-40, GC(XIX)/INF/154, paras 8-17, GC(XX)/INF/161, paras 8-23, GC(XXI)/INF/169, paras 8-32 and GC(XXII)/INF/177, paras 9-30.

1. Safety standards and quality assurance

74. In the regulation of nuclear power, the existence of nuclear safety standards and strict compliance with them play a dominant role. In carrying out its responsibilities, the nuclear regulatory organization subjects the building plans for each nuclear power plant to a thorough review before issuing a construction permit, carefully inspects and tests the completed structure before issuing an operation licence and inspects the plant regularly thereafter. These reviews are made so as to ascertain that the plant is designed, constructed and operated in such a way as to ensure the safety and to protect the health of the plant operating personnel and the general public. In the absence of a set of comprehensive safety standards, the review of a nuclear power plant requires a comprehensive investigation and assessment of all reactor systems and components. In such a case, verification - through testing, inspections and surveillance during the manufacturing of reactor components and during plant construction and operation - is a continuous process (it is obvious that the reliability and effectiveness of such reviews - in the absence of established standards - will depend entirely on the skill and experience of the inspectors). In countries that have established their own safety standards or have taken over those of an exporting State, the framework exists for the objective evaluation of, for example, system designs, components and the construction and operation of nuclear power plants through inspections and critical reviews.

75. In ascertaining conformance to safety standards - for example, during reactor construction - the regulatory organization may use various approaches. The two most commonly used are the following:

(a) The regulatory organization carries out the design review and verifies the conformance of systems and components to established requirements through inspections and tests. These verifications are made by authorized and independent inspection organizations acting on behalf of the regulatory organization; or

(b) The regulatory organization adopts a policy of auditing and document review supplemented, when necessary, by sampling inspection of the work. This method is a possible alternative provided all persons responsible for work performance in a nuclear power project are obliged to plan, perform and document their work in a systematic manner.

76. In a majority of Member States the regulations governing nuclear power are oriented toward the second approach - that is, the review process in combination with sampling inspections. There is a need with this approach for the detailed specification of all requirements in the form of standards so that the acceptance of the nuclear power plant by the regulatory organization can be based on objective evidence of the achieved quality of the work. Proper execution of all prescribed activities and the verification of conformance must be ensured through administrative and technical measures.

77. The management system which is established to ensure that all prescribed activities affecting the quality of a nuclear power plant are performed in a planned and consistent manner is known as the quality assurance (QA) system; the sum of the actions that have to be taken to establish confidence in the adequacy of the design, construction and operation of a nuclear power plant in accordance with pre-established requirements is referred to as the QA programme. With the establishment of the QA system and the efficient implementation of approved QA programmes by all persons and organizations responsible for a given nuclear power project, the regulatory organization can develop confidence in the documentation presented as evidence of the satisfactory completion and required quality of work; under such a system, full-time inspection and continuous surveillance of the construction work is unnecessary.

78. QA requirements are spelled out in regulations and standards in which elements and functions of the QA system are specified for various activities and phases of a nuclear

power project. Some standards pertain to the qualification and competence of the personnel carrying out the work, including those involved in construction and those assigned the responsibility for verifying specific activities and performing control operations. The purpose of a QA system is to ensure the timely and proper performance of all basic tasks and, through the verification of the conformance to standards and specifications of reactor components and work operations, to ensure the timely detection of non-conformances and their rectification.

79. QA includes quality control, which, in the context of the construction and operation of a nuclear power station, encompasses ".... those QA actions which provide a means to control and measure the characteristics of an item, process or facility to established requirements". Quality control includes such activities as inspection, testing, surveillance and monitoring.

2. Quality assurance requirements

80. As a part of its programme of preparing codes of practices and safety guides for nuclear power plants, the Agency has published a "Code of Practice on Quality Assurance for Safety in Nuclear Power Plants". This code contains principles and guidelines for the establishment of a QA system for nuclear power projects.

81. The establishment and implementation of the QA system is always the responsibility of the organization bearing the technical and financial responsibility for the plant. This is usually the plant owner, but may be any other organization having the same or analogous responsibilities under national legislation. The responsible organization discharges its responsibility directly and through contractual arrangements with the designers and constructors of the plant. The responsible organization may delegate the task of establishing the QA system and implementing the QA programme to another organization, but it retains responsibility for the effectiveness of the QA programme.

82. The execution of a QA programme involves both the implementors of project activities and those responsible for verifying the quality of the work performed. Therefore, QA is an important function of all departments which perform quality-related activities. However, in the construction of a nuclear power plant, where specialists are used in carrying out most activities, the attainment of quality objectives is the responsibility of those who are actually doing the work. This applies, for example, to the designers, welders and operators, who should also review their own work. Verification of the conformance of materials, parts, components and work to established requirements is carried out by those who do not have direct responsibility for performing the work - for example, by design reviewers, checkers, inspectors, testers and auditors.

83. Personnel performing quality-related work on nuclear power plant projects need a general orientation in QA principles and methodology. This orientation should be obtained through appropriate theoretical and practical training. Quality control and verification personnel must have sufficient freedom from production pressures to be able to identify quality deficiencies and ensure their correction. Two related functions are often assigned to such personnel: (i) construction site and shop inspections, and product quality control and product acceptance testing; and (ii) duties such as QA programme formulation and co-ordination, approval of procedures and auditing of the QA programme.

3. Quality assurance system elements

84. The system should contain the following elements to ensure that QA activities are executed properly and efficiently:

(a) QA programme: This consists of written procedures and instructions for performing all activities affecting the quality of the plant and plans for the systematic implementation of these procedures;

(b) QA organization: Activities affecting quality should be performed in an organizational structure with clearly defined responsibilities and authority. The achievement of quality is the responsibility of all participants in a nuclear power project; both quality control and verification functions should be performed by individuals who have not directly participated in the activities being verified;

(c) QA records system: A set of records that has been consistently prepared, filed and maintained is a prerequisite for the evaluation of QA system effectiveness. Records represent objective evidence of quality and thus are needed to document the conformance of performed activities to established specifications and procedures.

4. Quality assurance system functions

85. The QA system must provide for the control and verification of all important project activities. The overall QA programme for nuclear power projects should include the following activities:

(a) Documents control: Document preparation, review, approval and distribution should be subject to control to ensure that only accurate and approved documents are used;

(b) Design control: Design processes and design documents are subject to control to ensure that the applicable regulatory requirements, codes and standards are correctly translated into specifications, drawings, procedures and instructions;

(c) Procurement control: Regulatory requirements, design criteria and other quality requirements must be included, or referenced, in procurement documents; procurement staff must insist on compliance by suppliers with regulatory requirements regarding quality. Purchased material and equipment must conform to the quality requirements specified in procurement documents. The prescribed control measures should include an examination of the products upon delivery and of objective evidence concerning their quality;

(d) Control of processes: Processes such as welding, heat treatment and non-destructive examination (NDE) should be carried out under controlled conditions using prescribed procedures by qualified and skilled personnel;

(e) Inspection and test control: For verification purposes a programme of inspections and testing should be established and carried out for each item or work operation, where necessary, to ensure quality. All devices used for verification activities must meet minimum standards for such equipment and should be checked, adjusted and calibrated at regular intervals;

(f) Identification and control of materials, parts and components: Identification and control of materials, parts and components should be ensured through appropriate marking or labelling, or through readily accessible records traceable to individual items; these measures should also provide a means for tracing items back to their supplier and to their location within an assembly;

(g) Non-conformance control: Materials and components not conforming to standards must be identified and segregated from other stored items to prevent their inadvertent use or installation; their final disposition should be the subject of a thorough review;

(h) Corrective actions: Conditions adverse to quality or the maintenance of quality, once identified, must be corrected and appropriate measures taken to prevent their recurrence; and

(i) QA system audits: Regular and unscheduled audits within the organization (internal audits) and of suppliers and other contractors (external audits) should be made to establish confidence in the efficiency and adequacy of the QA system.

5. Personnel qualification for quality assurance

86. The most important concern in respect of the staffing of the QA organization is the competence of the personnel performing QA activities. It is essential that these persons have been adequately trained to ensure that suitable proficiency is achieved and maintained. The attainment and maintenance of proficiency should be the subject of written statements such as certificates. The certification of QA personnel is the responsibility of professional societies in some countries; where this is not feasible, certification can be arranged for by the plant owner, by the construction contractor or by local engineering organizations.

87. It is mandatory that all personnel responsible for performing QA work possess the education, experience and proficiency required for performing their assigned tasks. It is characteristic of QA work that a number of interdisciplinary skills are required. For this reason QA personnel are recruited from various engineering disciplines. They should receive additional training in QA methodology and attain proficiency through on-the-job experience. Moreover, several universities, especially in the USA, offer courses and academic degrees in "quality" and related disciplines which are relevant to QA work. The percentage of QA personnel in the nuclear industry with specialized degrees of this kind is still relatively small; in QA work, professionals who have transferred from other disciplines are still in the majority.

88. Formal qualification with certification is usually required only for the inspection and testing personnel and for the lead auditors of the QA programme. Additional, specialized qualifications and certification are required for NDE staff (NDE staff must meet this requirement in other industries as well). Three levels of qualification exist for inspection and testing personnel. The requirements for each level do not depend on an incumbent's position in the organization or his professional status, but on his assigned duties. These range from (i) performing and documenting inspections and tests to (ii) evaluating test results and (iii) assessing the adequacy of specific training programmes for inspection and testing staff. Although possessing the relevant education is a basic requirement for such personnel, additional education is not an acceptable substitute for experience in inspection or testing activities.

89. The audit personnel should be trained to improve their proficiency in performing QA programme audits. General qualifying training for audit staff includes audit fundamentals, objectives, characteristics, organization, performance, documentation, and result evaluation. However, only lead auditors must be formally certified in engineering, reactor construction, QA, and power plant operation. Although certification of the lead auditor is the responsibility of the employer, this function may be delegated to a specialized certifying agency. In either case, the administration of the certification process must satisfy recognized standards.

90. The certification of specific competence and skills related to QA is considered to be a supplement to formal education. However, due to the lack of formal educational opportunities in the QA area for personnel in higher professional categories, some professional societies, such as the American Society for Quality Control (ASQC), have established certification requirements for quality and reliability engineers. The basic requirements for becoming a certified quality engineer are to pass an examination and eight years of experience in disciplines such as quality control, reliability or QA. Candidates who possess the appropriate educational background, in addition to having passed the ASQC examination,

usually need only up to five years of experience for certification. Recently, the certification of engineers in QA disciplines has also been carried out by ASQC in countries outside the USA. Although this certification is not a formal requirement of the regulatory organization in the USA, the certificate of a quality engineer is recognized as evidence of competence in QA and related technologies.

6. The Agency's capability to provide assistance

91. Since 1973 the Agency has been developing its capability to provide assistance in QA and related disciplines. A first step in this direction was the formulation of a set of requirements and recommendations on QA which may be used by a Member State as a basis for its own QA regulations. This activity is a part of the Agency's broad programme of safety standards development, which encompasses safety codes and guides for siting, reactor design, nuclear power plant operation and regulatory body organization. Together with QA, these safety standards can serve as a basis for national legislation in respect of nuclear power plant safety. These Agency documents have been written in such a form as to enable their application directly by a Member State to nuclear energy activities under its jurisdiction.

92. At present, in addition to various safety standards, the "Code of Practice on Quality Assurance for Safety in Nuclear Power Plants" has been published, as mentioned above, and ten safety guides are in various stages of preparation. It is estimated that by 1981 all the foreseen safety guides will have been published, thus providing a codification of internationally recognized QA requirements and recommended methods of implementation. These documents, intended primarily for use by regulatory organizations, will also provide guidance to plant owners and others involved in nuclear power projects.

93. The Agency is in a position to provide direct assistance to Member States in connection with the establishment of a QA organization and the development of a QA programme for nuclear power projects. Such assistance can take the form of special missions, advisory services, or individual technical assistance expert assignments. Advisory services have been provided to Brazil, Mexico and Turkey, and QA experts have been assigned for three months to one year to Argentina, Brazil, Egypt, the Republic of Korea and Mexico. These experts assisted in the preparation of expertise on QA programmes and organization, gave lectures on QA principles and practices, demonstrated the use of equipment and instrumentation for testing and inspections, and participated directly in such QA activities as test surveillance and QA programme audits.

94. The Agency can also provide assistance in the form of equipment with and without associated expert services. NDE equipment for the in-service inspection of a nuclear power plant has been provided to Bulgaria, and the supply of similar equipment to other developing countries is under way. The Agency is also assisting a large-scale UNDP-supported project in Argentina in the strengthening and equipping of a national centre for non-destructive testing and quality control. This centre is oriented toward providing services to industry and to the country's nuclear power programme.

95. Within the framework of its programme on manpower development for nuclear power projects the Agency has organized training courses on QA. The purpose of these courses is to train engineers in QA principles and practices and, in particular, in the preparation, development and implementation of QA programmes. The first such course on this subject was organized in co-operation with the Government of the USA and held in 1978 at Argonne, Illinois; 34 participants from 22 countries attended this five-week course. A similar course will be conducted in 1979 at Madrid, Spain. The course will be given in Spanish and is being organized in co-operation with the Government of Spain. As a result of the interest shown by the developing countries in QA training, similar courses will be held in 1980.

96. Regional and interregional seminars are organized by the Agency and provide training to specialists from developing countries in specific areas of nuclear technology; these seminars stimulate discussion on a number of basic issues of nuclear power. QA was the subject of a seminar for countries in the Asia and the Pacific Region which was held in

Bangkok, Thailand in 1978. This seminar, covering the implementation of QA requirements during various phases of a nuclear power project, was conducted by guest lecturers; contributions were also made by the participants, resulting in extensive and valuable discussions. Participants from developing countries received financial support from the Agency to help defray their cost of attendance.

97. The Agency offers opportunity to applicants from developing countries to obtain academic and on-the-job training in QA through its fellowship programme. As mentioned above, several universities in developed Member States offer special courses and degree work in quality-related disciplines and as an integral part of training in nuclear technology, nuclear engineering and reliability. Specialized courses in quality control methods and techniques are also offered by governmental institutions, consulting firms and other contractors. These courses vary in duration, from a few days up to several months; some are held regularly, others only by arrangement.

98. On-the-job training is of particular importance to potential QA personnel. Such training, which can be organized by the Agency upon request, can be extremely valuable as a follow-up to formal instruction in one of the special courses mentioned above or at a training course seminar in QA. In co-operation with the Government of the host country, the Agency is usually able to place an applicant in an organization such as a utility company with nuclear-power-generating facilities or in the office of a nuclear power architect/engineer, where the applicant would be attached to a QA group and participate in its day-to-day activities. The interest of personnel from developing countries in training in QA subjects through the Agency's fellowship programme is increasing. Whereas in 1977 the number of fellowships awarded in the area of QA/quality control was only four, more than ten applications have already been received for training of this kind in 1979. It is felt that the Agency will be able to accommodate all these applicants, although some difficulties have been experienced in finding an adequate number of on-the-job-training opportunities.

99. In view of the important role played by QA in ensuring safe and reliable operation of nuclear power plants, more emphasis should be given to this activity by countries with nuclear power programmes, as well as by those planning to introduce this technology in the future. Whereas the technology of nuclear energy has, in large part, been demystified and nuclear power is on the road to becoming a "traditional" source of energy, it cannot become fully "conventional" in the sense that special, increasingly stringent regulations will be applied to it, and safety will remain a unique concern. To help ensure that the nuclear power industry's impressive safety record is maintained, the Agency will continue to provide assistance for QA and related activities, without which the exploitation of this source of energy would be unthinkable.

B. RADIOSTERILIZATION OF MEDICAL SUPPLIES

100. The existence in some countries of nuclear reactors with a high neutron flux has made it possible to produce significant quantities of the gamma-emitting isotope cobalt-60 at reasonable cost. Owing to the decay rate (12.5%/year) and radiation energy of this isotope, it is particularly suited for radiation processing applications such as the sterilization of medical supplies, the preservation of food and the chemical modification of materials through irradiation. During the past 20 years considerable attention has been focused on the utilization of cobalt-60 for irradiation on an industrial scale, and success with the technology has been achieved in many countries.

101. Sterility is the chief quality criterion for medical supplies of various kinds. In a radiosterilization facility, hermetically sealed supplies, packed in cardboard boxes, are made to pass via a conveyor system round a cobalt-60 source in several cycles (on a different level or shelf during each cycle so as to ensure uniform exposure of the product to the radiation source); the ionizing radiation emitted by the cobalt-60 penetrates the packaging material, destroying microbial pathogens and rendering the product sterile. As the product is pre-sealed, sterility is maintained until such time as the seal is broken.

102. Compared with conventional techniques, radiosterilization has numerous advantages, of which the following are important:

(a) An irradiation facility can be operated continuously with a minimum of maintenance and attendance;

(b) Operational reliability is high;

(c) There is a high degree of sterility assurance;

(d) No toxic chemicals are used; and

(e) Many single-use items can be made of plastic materials, which can also be used for packaging.

103. The first commercial radiosterilization plant went into successful operation some 20 years ago. At the present time nearly 50 plants are operating in all parts of the world, offering extensive irradiation services on a routine basis. As a result, single-use medical supplies of high quality have become widely available, and this has contributed greatly to an improvement in public health.

104. In spite of the success and popularity of radiosterilization in industrialized countries, this technology was not introduced to the developing world until 1970. Since then the Agency, with the assistance of UNDP, has successfully promoted radiosterilization through a number of projects in, for example, Hungary, India, the Republic of Korea and Yugoslavia. Also, Egypt has received large-scale UNDP assistance through the Agency for a project of which one objective is the introduction of radiosterilization technology. The IAEA/UNDP assistance to these projects went beyond the mere demonstration of techniques and the provision of equipment; the emphasis was on establishing commercial irradiation services and on demonstrating economic viability. The plants constructed in the five countries just mentioned were all designed to accommodate a cobalt-60 source of up to one megacurie.

105. Although the need for adequate supplies of sterilized single-use medical products is felt the world over, various circumstances make it difficult to introduce radiosterilization technology successfully, particularly in developing countries. For example:

(a) Although local manufacturers may have an interest in industrial-scale radiosterilization, individual production capacity is often not sufficient to justify the construction and operation of an irradiation facility; there is consequently a tendency to rely on conventional and, ultimately, less reliable techniques;

(b) Since the acceptance of single-use items is seldom immediate, increases in throughput at a radiosterilization plant tend to be gradual and to extend over several years; a five- to tenfold increase from initial operation to peak demand for radiosterilized products is not uncommon;

(c) Industrial enterprises may be reluctant to construct radiosterilization facilities in the absence of sufficient local personnel trained to work with high-energy sources of radiation and to conduct necessary marketing campaigns; and

(d) Due to the lack of a long-term plan, the management of some radiosterilization facilities, in an effort to recover the investment as soon as possible, tend to price the plant's services out of the market.

106. What emerges from an examination of these circumstances is the following: financing can be a problem, trained personnel are in short supply and efficient operation can usually be achieved only gradually. The Agency has sought to assist Member States in surmounting the obstacles which often stand in the way of the development of irradiation technology.

Before encouraging Governments to introduce radiosterilization, it suggests that factors such as the demand for various single-use medical supplies, production parameters, modes of distribution, the availability of suitable packaging materials and standards of hygiene at all manufacturing stages are taken fully into account. The five projects already referred to are discussed below.

107. India: A demonstration facility was established for the radiosterilization of medical supplies, including vasectomy kits for the country's population control programme. The plant, which utilizes dry storage for the source, was constructed over the period 1972-73 by H.S. Marsh Ltd. The UNDP contribution of $671 000 was used to equip the facility, to expand cobalt-60 production at the Bhabha Atomic Research Centre (BARC) and for the purchase of packaging materials and analytical instruments. It was determined that the radiation efficiency of the plant was roughly 30% for a product density of 0.2 g/cm^3 with a source of 125 000 Ci. The overall objective of the project was attained as BARC was able to establish a body of competent staff for dealing with engineering problems, microbiological assay and the promotion of commercial irradiation services. Moreover, improved packaging techniques were developed. Fellows from a number of countries in the region have received training in irradiation technology.

108. Republic of Korea: A major objective of the project was the establishment of a cobalt-60 irradiator for the sterilization of bandages and surgical dressings. Supplied by Atomic Energy of Canada Ltd. (AECL), the irradiator was designed to specifications drawn up by the Agency. A radiation efficiency of 36% was obtained for a product density of 0.2 g/cm^3 using a 100 000 Ci source. Although the technical objectives have been met, full utilization of the throughput capacity - a requirement for cost-effective operation - will be achieved only through greater co-operation between the Korean Atomic Energy Research Institute and local manufacturers of medical supplies. The UNDP contribution to this project amounted to $452 800.

109. Hungary: A radiosterilization facility was constructed on the site of a medical supplies manufacturing plant (Medicor) in Debrecen by AECL and commissioned in 1976. The radiation efficiency with a cobalt-60 source of 250 000 Ci is 38%, based on a product density of 0.2 g/cm^3 with a dose uniformity ratio of 1.2. This performance figure is considered to be the best among all existing radiosterilization facilities in the megacurie range. A unique feature of this plant is "integrated" production, whereby all major manufacturing processes, including sterilization, are carried out under one roof. Some 7.8 million hypodermic and surgical needles of various sizes were treated in 1978, and it is expected that a throughput of 400 million needles/year will be reached in the next two years. Packaging techniques and production parameters have been optimized to permit cost-effective, commercially viable operation. UNDP's contribution to the project was $527 000.

110. Yugoslavia: A radiosterilization facility similar in design to the Hungarian plant described above was established at the Boris Kidrič Institute over the period 1975-78. This plant, which allows for either batch or continuous sterilization, was supplied by the French Commissariat à l'énergie atomique. Operation commenced in August 1978 with a 200 000 Ci cobalt-60 source, and the counterpart organization is now beginning to promote its services to Yugoslav manufacturers of single-use medical supplies. The contribution of UNDP to this project was $434 000.

111. Egypt: A cobalt-60 irradiation facility was established at the National Centre for Radiation Technology and commenced operation in February 1979. The Agency supplied expert services, fellowship training abroad and test instrumentation. An electron accelerator was also provided, as part of the project, for research on polymers; it may also be used for the sterilization of sutures and similar medical products. UNDP's contribution to this project amounted to $636 000.

112. Over the past decade, as an executing agency for UNDP large-scale assistance, the Agency has acquired valuable experience in the field of radiosterilization, and in 1978 it expanded its efforts under the regular programme by assisting Ghana and the Philippines.

Before embarking on radiosterilization programmes, developing countries should conduct surveys to determine whether it is economically feasible to introduce the technology and whether an adequate infrastructure exists. Important in this respect are (i) market surveys of the local production and consumption of medical supplies, (ii) surveys of packaging methods used in the country and the use of plastics by medical manufacturers, and (iii) microbiological assays of locally manufactured medical supplies prior to sterilization.

113. These can provide valuable information concerning the suitability of the medical supplies in question for radiosterilization and the potential demand for them. In undertaking surveys it may prove desirable to obtain the services of an outside specialist to assist in the compilation and interpretation of data. If, for instance, findings from microbiological or packaging studies indicate unsatisfactory conditions, consultants might be requested to assist in the improvement of manufacturing operations and local staff sent abroad for specialized training.

114. In the construction of various irradiation facilities it has been observed that, once multilateral assistance to a project has been approved, it is necessary for national staff responsible for civil construction work to co-operate closely with the supplier of the equipment. For installation and commissioning, the best approach is to train local staff on site since the most important operational aspect is the transport of goods through the irradiation cell on the conveyor. Also, the facility is the most appropriate location for training in plant maintenance and operation. Training related to various aspects of radiation technology, dosimetry and microbiological quality control can be provided either by experts assigned to the project or at institutes abroad to which project personnel is sent during the planning stages.

115. The positive contribution which radiosterilization can make to public health should be given due consideration by the developing countries. The use of disposable sterilized medical supplies can reduce significantly the incidence of many infectious diseases - for example, hepatitis - which continue to pose serious health problems. The Agency feels, therefore, that this technology has positive social and economic ramifications and will continue to play an important role in the improvement of public health on a global scale.

C. THE AGENCY'S FELLOWSHIP PROGRAMME

116. The Agency's fellowship programme, which began in 1958, continues to be popular with developing Member States, which submitted 457 nominations for fellowship awards under the regular programme in 1978.[8] Since 1969 some minor variations in demand and changes in fields of interest have occurred which are worth identifying.

117. During the period 1969-78, applicants from 78 developing Member States received fellowship awards. As numerous countries have comprehensive programmes relating to the Agency's areas of competence, they request training assistance on a more or less regular basis, whereas countries with less comprehensive programmes in the nuclear field request fellowships only occasionally, when the need for training arises. Accordingly, there have been year-to-year fluctuations in the number of Member States submitting fellowship nominations, the average number of countries per year to receive fellowship awards during the past decade being 50, with 22 Member States receiving awards each year. No upward trend has been observed in the number of countries submitting nominations year by year, even though the number of recipient Member States has increased.

118. On average, 471 regular programme fellowship nominations were received each year during 1969-78. Although statistical variations are evident, mathematical analysis of the yearly data indicates a slightly decreasing demand; it has been found that the number of nominations received from 1969 to 1978 decreased by about 0.5% per year. Although this decrease is neither large nor very significant, it can be interpreted as indicating that Member States are satisfied with the number of fellowships made available to them and have not felt it necessary to increase the number of nominations submitted.

[8] In addition, 114 nominations were received in respect of applicants for awards financed from SIDA large-scale assistance and UNDP funds.

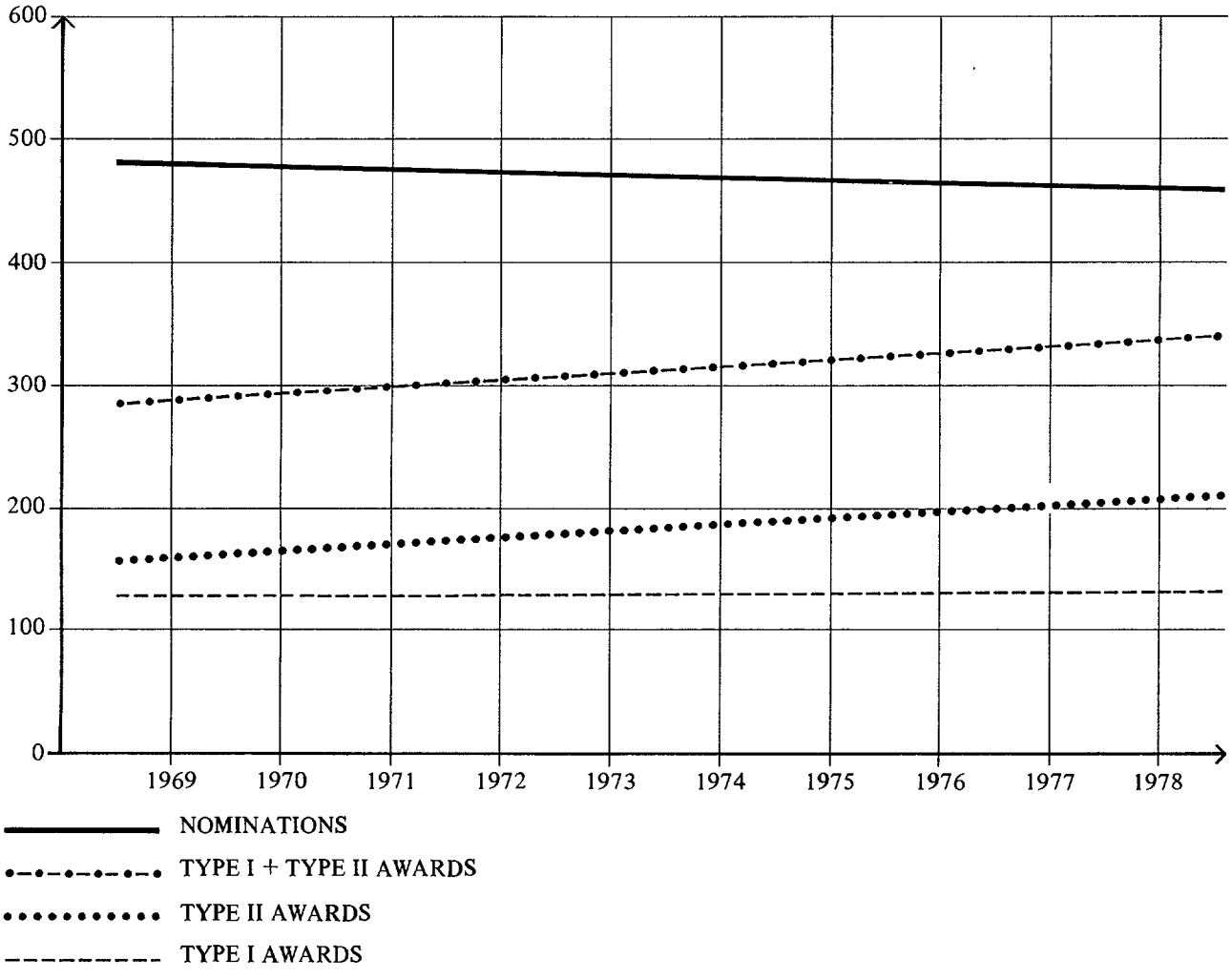
119. There are two kinds of awards made under the Agency's regular programme: Types I and II. Type I fellowships are financed directly by the Agency from the voluntary contributions paid into the General Fund, whereas Type II fellowships are financed from gifts in kind made available to the Agency by Member States in addition to or in lieu of voluntary contributions. For simplicity's sake, many of the training awards financed from extra-budgetary funds are classified as Type II fellowships, owing to the relatively low volume of awards of this kind.

120. During the past ten years the Agency has awarded an average of 129 Type I fellowships each year. Although there were year-to-year fluctuations in the number of Type I awards, mathematical analysis indicates that there has been no significant variation on a year-to-year basis. In other words, the number of Type I fellowship awards has remained essentially constant.

121. Mathematical analysis of the year-to-year data shows that the number of Type II fellowships awarded has been increasing at a rate of nearly six per year. This upward trend is due mainly to the annual increases in the number of training opportunities offered by the USA.

122. Various trends can best be seen on the graph below, which shows that the percentage of applicants receiving awards is steadily increasing. This may indicate that the combination of educational background and working experience of applicants is gradually improving.

NOMINATIONS RECEIVED AND FELLOWSHIPS AWARDED PER YEAR (1969–1978)



123. There has been some change during the last ten years in the fields in which training has been requested from the Agency. In particular, there seems to have been a shift in emphasis away from theoretical training towards technology and applied science. This can be seen from the following table which shows the ten fields in which training is provided through the Agency and the percentage of fellowships awarded in each field during three periods. The data relating to the first period (1958-70) were prepared for the technical assistance report for 1970.[9] During this period the distribution of training remained fairly constant. Moreover, the figures in the column for 1969-73 are identical with or close to those in the column for 1958-70. The significant changes which occurred show up in the column for 1974-78, especially when compared with the figures for 1958-70.

Field of training	Percentage of total fellowships awarded		
	1958-70	1969-73	1974-78
General atomic energy development	1	2	5
Nuclear physics	21	21	10
Nuclear chemistry	11	8	6
Prospecting, mining and processing of nuclear materials	4	4	7
Nuclear engineering and technology	22	21	23
Application of isotopes and radiation in:			
Agriculture	13	16	18
Medicine	11	11	14
Biology	6	5	4
Industry and hydrology	4	6	5
Safety in nuclear energy	7	6	8
	100	100	100

124. As a result of expanded nuclear activities in many countries, a significant increase in training in the field "General atomic energy development", which includes activities related to nuclear regulatory matters, has taken place (from 1% to 5%). For "Nuclear physics" and "Nuclear chemistry", which are more theoretically orientated than the other fields, the percentage of fellows trained has fallen to about 50% of the 1958-70 level. There has been a significant increase in training related to uranium exploration, mining and processing and also to the use of radioisotopes in agriculture and medicine. It appears that the interest of developing Member States is turning increasingly towards applications of nuclear science and the development of nuclear resources. By comparison, in the years prior to 1970, there was more emphasis on the training of physical scientists.

125. As a routine procedure, Agency fellows are requested to complete a questionnaire about their fellowships and return it to the Agency several months after they have returned to their home countries. A sample of these questionnaires, covering the training period 1976-78, has been studied in order to evaluate the effectiveness of the training provided. Given below are some of the more noteworthy findings:

[9] GC(XV)/INF/131, paras 29-39.

91% of the fellows surveyed indicated that their training was directly related to the work they were doing after their return home;

80% said they expected their training to be of significant value in their future work;

33% called attention to new techniques learned during their period of training;

14% either received degrees in the course of their fellowship training or could apply the experience gained to their Ph.D. dissertations after their return home;

23% published at least one scientific or technical paper as a result of their fellowship training experience.

126. As many as 25-35% of the applicants nominated for a fellowship under the regular programme do not become Agency fellows.[10] The reasons for this are given in paragraph 64 above. Looking at the positive side, one can say that the applicants selected for fellowship awards:

(a) proposed logical and well-prepared training programmes relating to important ongoing activities in their own country; and

(b) met the language requirements for the country in which training was requested.

127. Although a gradual decrease in the number of nominations for fellowships under the regular programme is apparent, it would be incorrect to conclude that the fellowship programme itself is on the decline; on the contrary, the number of awards is increasing. Thus, it would appear that, until such time as numerous additional sound and well-prepared nominations are received, the Agency resources devoted to this activity under the regular programme are sufficient.

D. INFORMATION ON SOME SELECTED PROJECTS

1. Regular programme-assisted projects

128. Information is given below on a cross-section of the projects receiving assistance under the Agency's regular programme in 1978:[11]

(a) Nuclear science in Afghanistan: More than two years of expert services in the form of intermediate and short-term expert missions were provided to a programme on the introduction of nuclear techniques in hydrology, agriculture and veterinary science. A comprehensive multi-year approach was adopted, whereby assistance was provided for a variety of activities without recourse to small ad hoc arrangements. Co-ordination was thus improved and the assistance rendered more effective. It is felt that such co-ordinated, multi-field projects will be of most benefit to developing countries where the need is greatest for assistance of a fundamental nature on the application of nuclear techniques;

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[10] The comparable figure in 1978 for fellowship training financed by UNDP was 9%; in 1978 less than 5% of the nominees for fellowships financed from SIDA large-scale assistance funds failed to take up their awards.

[11] Information is given in Annex VII on the regular programme projects completed or cancelled during 1978.

(b) Assistance to the Institute of Nuclear Physics in Albania: The Agency has been providing assistance to the Institute of Nuclear Physics in Tirana, the central institution for nuclear affairs in the country, since 1973. This assistance has taken the form of expert services on activation analysis, X-ray fluorescence analysis and the application of isotopes in agriculture. (Also planned for the near future is UNDP assistance to two projects to promote research in nuclear physics and food irradiation technology.) As a result of the Institute's close co-operation with various specialized institutes in the country, the assistance provided by the Agency is extended to all areas in which nuclear techniques may be of value;

(c) Trace-element analysis in Bangladesh: The Bangladesh Atomic Energy Commission (BAEC) initiated a programme in 1975 aimed at developing facilities at its Dacca Centre for microelement analysis. Equipment available for such work comprised a 3 MeV positive-ion Van de Graaf accelerator and a number of multi-channel analyser systems. The Agency provided a short-term expert in 1978 to assist BAEC in developing a method of proton-induced X-ray emission analysis, using the accelerator for microelement analysis of biological and mineral samples. The expert was successful in introducing this technique, and the laboratory is now providing analytical services to a number of national institutions;

(d) Radioisotope production: sealed sources in Brazil: Five months of expert services were provided to Brazil's Nuclear Energy Commission for a project on radioisotope production carried out at the Institute of Atomic Energy in São Paulo. During the expert's mission existing techniques for the production of sealed radioisotope sources were improved and new procedures developed. Tungsten-inert-gas welding techniques were introduced and designs were proposed for equipment and facilities. In addition, numerous recommendations were made in respect of future activities at the Institute, including a comprehensive proposal for the establishment of a quality control programme;

(e) Raw materials prospection in Indonesia: Assistance has been provided to this project, concerning the identification of zones favourable for uranium mineralization, since 1976. In addition to equipment, the Agency provided an expert in uranium geochemistry who assisted the national atomic energy agency, BATAN, from 1976 to 1978 in the reconnaissance evaluation of a 40 000 km^2 project area in Central and Southern Sumatra as well as in the establishment of analytical facilities. Counterpart staff at BATAN now form a team which is capable of applying methods used in modern geochemical exploration and is conducting reconnaissance work in 14 major areas recommended by the expert as worthy of follow-up. The rapid, relatively inexpensive reconnaissance survey techniques now being used are of great importance to developing countries;

(f) Isotopes in agriculture in Malaysia: The objective of this project was to strengthen teaching and research capability in respect of radiobiology in Malaysia, as well as to assist in the application of radioisotopic techniques to plant breeding. Lecture and laboratory courses were given at the undergraduate and post-graduate levels, and a research project was started on the mutation breeding of rice in co-operation with the Crop Production Division, MARDI (Malaysian Agricultural Research and Development Institute). This work is being carried out at the Central Rice Experimental Station at Bumbong Lima. The aim of the breeding project is to select mutants with resistance to blast disease and brown plant hopper infestation; screening will be carried out in greenhouse and field experiments in 1979. Another project has been started on soybean breeding; four institutions are participating in this Joint Malaysian Soybean Breeding Project (the National University of Malaysia, MARDI, the Rubber Research Institute of Malaysia and the University of Malaysia). The first field experiments will be undertaken in 1979. A notable feature of this project is the successful co-operation which has developed between various agricultural institutions in respect of the use of nuclear techniques;

(g) Computer maintenance in Pakistan: Reliable operation of the Karachi Nuclear Power Plant (KANUPP) depends, to a great extent, on the continuous, trouble-free performance of four control computers and ancillary electronic equipment. As modular printed circuit construction is used extensively in these units and the control computers are no longer being manufactured, replacement of defective modules entails exorbitant capital outlays. The Agency provided KANUPP with equipment for the laboratory production of printed circuit boards in 1978 which will enable national personnel to construct the required electronic components and, at the same time, obviate the need for expenditures of hard currency;

(h) Uranium prospection in Paraguay: Expert services and equipment, including a gamma-ray spectrometer, fluorimeter and portable scintillation counters, were provided. As a result of exploration carried out during the course of the project, a promising uranium occurrence has been identified. The expert assigned to the project also assisted in the training of personnel, the selection of candidates for fellowship training and the compilation of a geological map of the region;

(i) Neutron physics training in Sri Lanka: A shortage of teaching staff in the Department of Physics, Peradeniya Campus, occurred in 1976 as many faculty members left for positions at other campuses in the country where the conditions of work are more favourable. A major cause of this situation was the lack of adequate research facilities in the Department. The Agency, under its regular programme for 1977, supported a project aimed at improving facilities and the physics curriculum. Three courses oriented towards nuclear science, including practical laboratory work, were planned by the Department for fourth-year students. As there was no possibility for work with neutrons, the Agency provided the project with equipment for a neutron physics laboratory, including a ^{252}Cf neutron source, a gamma spectrometer, a neutron counting assembly, a thermal neutron dosimeter and other smaller items in 1977-1978. An Agency expert, assigned to the Department for 12 months, arrived at the project site in March 1978. Although initial difficulties were experienced, the objective of establishing a solid curriculum within the Department of Physics is being met;

(j) Secondary standards dosimetry laboratory in Thailand: In the course of establishing the IAEA/WHO network of secondary standards dosimetry laboratories the Agency, at the request of the Thai Government, undertook to provide a ^{60}Co source to be used for calibration purposes by the Radiation Protection Service in Bangkok. An Agency staff member visited the Service in 1977 to advise on shielding requirements for the radiation bunker. Further developments in 1978 were considerably delayed owing to difficulties in procuring a suitable source and, subsequently, in arranging for transport of the source to Thailand. It is envisaged that additional expert services will be provided to the Radiation Protection Service in respect of calibration and the establishment of a radiation dosimetry/metrology programme;

(k) Nuclear power safety in Turkey: The Turkish Electricity Authority (TEK) plans to construct a 600 MW(e) nuclear power plant at Akkuyu on the south-western coast of the country. The Agency has provided short-term expert services for a variety of activities including siting, bid evaluation and the preparation of safety analysis reports, as well as training through Agency-sponsored courses and fellowships. Such assistance has had a positive effect on manpower development and improved TEK's capability in nuclear power plant construction. As TEK's activities become increasingly commercially oriented in the construction phase, Agency assistance will be concentrated on strengthening Turkey's very modest regulatory authority. Continuation of this assistance over a number of years is envisaged; and

(l) Plant breeding in Venezuela: Assistance was provided to the Faculty of Agronomy, University of Zulia, Maracaibo, for a project on plant breeding whose objective is to develop improved varieties of sorghum and legumes adapted to local

conditions. The Agency's expert initiated a mutation breeding programme, and encouraging results have already been obtained. Training was also given to local staff in irradiation techniques. This project, which is scheduled to continue through 1979, suffered a temporary interruption due to the unexpected departure of the expert.

2. UNDP-assisted projects

129. A complete list of the operational projects receiving UNDP assistance through the Agency in 1978 is given in Annex VI, and data on the fellowships and the seminar financed from UNDP funds in 1978 are provided in Tables 3 and 6. Information is given below on some country programme projects assisted by UNDP:

(a) Application of nuclear technology in agriculture in Brazil: Large-scale UNDP assistance was provided to phase I of this project, to help improve agriculture production in the country through the use of nuclear techniques. The counterpart organization, the Centro de Energia Nuclear na Agricultura (CENA), received assistance in soil science, microbiology, plant breeding, plant genetics, entomology, hydrology-ecology, biochemistry, electron microscopy, stable isotope research, basic sciences (including radiochemistry, health protection and laboratory analysis), animal parasitology and nutrition. Emphasis was also placed on the training of national staff in basic and specialized techniques relevant to agricultural research. The UNDP contribution to the project during phase I amounted to approximately $1 340 000, which included 172 man-months of expert services, 174 man-months of fellowship training, and equipment. Among the major items provided were a 30 000 Ci cobalt-60 source, automatic liquid scintillation counting and sample preparation equipment, a low-background anticoincidence counter, radiation monitoring equipment, a neutron probe for soil-moisture determination, gas chromatography equipment, growth chambers, single-plant threshing machines, fume hoods, an atomic absorption spectrometer, block digestors and radioisotopes. Whereas the project's major objectives were attained during phase I, it is foreseen that phase II will permit the consolidation of previous achievements and continued growth of expertise over the next three years. Greater emphasis is being placed on animal science, which was handicapped by unforeseeable events during phase I; practical work in mutation breeding will also be continued. In addition, important hydrology and environmental studies in Amazonas will be undertaken, and continued minor support is to be provided for research on soil fertility;

(b) Technological applications of nuclear energy in Chile: The objectives of this large-scale-assistance project were to introduce nuclear techniques to the country and to enhance the expertise of local personnel in various aspects of nuclear technology. During the life of the project two nuclear reactors reached criticality and are now used extensively for various purposes. National counterparts were trained in radioisotope production, nuclear engineering, reactor operation, quality control of isotopes, dosimetry, radiopharmacy, hydrology, activation analysis and nuclear medicine through in-service and fellowship training as well as seminars and lectures given by international experts. Thirty international experts contributed to this very successful project, and an equivalent number of professional couterparts received fellowship training abroad. Equipment was provided to the value of $300 000, comprising two vehicles, a cobalt-60 source, a mass spectrometer, a Ge(Li) detector, a gamma spectrometer, dosimeters, a radiochromatograph and ancillary items;

(c) Prospection for radioactive minerals in Colombia: Large-scale assistance to this project was initiated in 1978 to assist the staff of the Instituto de Asuntos Nucleares (IAN) in exploration for uranium. A phased, multiple-method exploration strategy - including aerial radiometry, ground radiometric and geochemical prospecting, drilling and evaluation of reserves - is being pursued, with major emphasis being placed on on-the-job and fellowship training abroad.

It is expected that IAN will have developed the capability to carry out a comprehensive uranium exploration programme after UNDP/IAEA assistance to the project terminates;

(d) Mutation breeding in Indonesia: The work in 1978 was concentrated on the selection of mutants for disease and pest resistance in rice. Improvements have been made in resistance to bacterial leaf blight in the rice variety, "Pelita". A large amount of work has been carried out in the screening for brown plant hopper resistance. Resistant mutants have been selected from "Pelita" and the early-maturing mutant line, A23. These are now being propagated and will be handed over to the Ministry of Agriculture for inclusion in their official variety testing programme;

(e) Development of nuclear technology in Romania: Phase I of this large-scale, UNDP-assisted project was completed in 1978, with a second phase initiated immediately thereafter. The objectives of phase I - to develop various aspects of nuclear power technology - were successfully met. Fuel element technology was introduced, leading to the production of UO_2 powder and pellets, as well as the fabrication and irradiation testing of fuel elements. A notable feature of this project has been the extensive co-operation received from foreign experts and organizations, whose services were secured under subcontract agreements. It is envisaged that the work on fuel elements will be completed during phase II and that quality control procedures, as well as safety aspects, will be emphasized. Training in the form of fellowships abroad and scientific visits was another important objective of this project. It is felt that the assistance provided by the Agency will contribute significantly to the solution of fuel fabrication problems associated with the introduction of nuclear power; and

(f) Nuclear medicine in Sri Lanka: This project, initiated in 1972, had as its objective the establishment of a nuclear medicine unit at the Faculty of Medicine, Peradeniya Campus, University of Sri Lanka. Requested for this work were equipment and radioisotopes for use in training programmes, chemical diagnosis and therapy. The project has helped in the establishment and operation of a nuclear medicine unit which is now used not only for teaching purposes but also for clinical diagnosis and treatment of some 3000 patients annually. As a result of the training received by medical doctors and other unit staff, the new techniques are expected to find wider application in Sri Lanka. In view of the increasing demand for clinical diagnosis for the 14 million inhabitants of the country, a second nuclear medicine unit is now being established in Colombo. This project, which had a small UNDP input of $15 000 over a period of six years, serves as a good example of what can be done in a developing country to enable the local people to develop and expand their own potential through very modest external assistance. The nuclear medicine unit at Peradeniya has now reached a stage where it is competent enough to host an Agency interregional training course on radioimmunoassay techniques (held in March-April 1979).

3. Extrabudgetary-supported projects

130. In addition to the SIDA-financed large-scale assistance to Bangladesh and India - the latter commenced in 1978 as a follow-up to the UNDP-supported project in agriculture at four prominent research institutes in India - and the significant sums made available by Canada and the USA in respect of approved projects under the regular programme, new sources of extrabudgetary funds have entered upon the scene, namely, Australia, Belgium, the Federal Republic of Germany and Japan. A large share of these additional funds has been earmarked for regular programme assistance. Belgium and the Federal Republic of Germany have made funds available and the United Kingdom has provided assistance in kind for a new kind of project that foresees the possible participation of a number of donors.

131. Assistance for this co-operative project on the Biological control of the tsetse using the sterile-male-insect technique was requested by the Government of Nigeria. The project's planning phase has now been completed, and a five-year operational phase began in January 1979. The project's main objectives are to investigate the advantages, efficacy and economics of the sterile-male-insect technique for controlling or eradicating the riverine species of tsetse fly, Glossina palpalis, in the field. The project has been integrated with other tsetse-trypanosomiasis-control projects now under way in the country. In addition, the first large-scale tsetse-rearing facility has been developed to rear tsetse flies using either guinea pigs (in vivo) or freeze-dried bovine blood through a membrane (in vitro) as the source of food. Mass rearing, research, administrative and animal-holding facilities, as well as housing for international and senior national staff, have already been constructed. Most of the international staff and the team of Nigerian counterparts - including more than 15 technicians and assistants - have been assigned to the project. Preliminary ecological surveys have been initiated to select biologically and ecologically similar areas (100-150 km^2 each) in which the tsetse fly is known to occur. At least one of these sites will be used for releases and one or two others for evaluating methods and techniques; the latter site(s) will also be used as untreated "controls" for making density and behavioural comparisons with the fly population in the area in which sterile insects will be released. Mass rearing of Glossina palpalis is now being started at Vom utilizing in vivo methods; in vitro methods will soon be introduced. The aim is to develop a Glossina palpalis colony of 100 000 flies as rapidly as possible. In the event of loss of the colony of flies at Vom, a back-up colony will be maintained by the Nigerian Institute of Trypanosomiasis Research in Kaduna. Plans are also under way to make field training at the project site an integral part of the programme for fellows from African countries in addition to specialized training at the Agency's Seibersdorf Laboratory.

ANNEXES I-VII

ANNEX I

STATISTICAL TABLES

Introductory Notes

Resources

1. Figure 1 and Table 1 show the resources made available for approved field programmes of technical assistance and thus do not include UNDP or SIDA overhead cost allocations. In addition, data in respect of offers of assistance in kind have been updated to 31 December 1978; for example, the value of Type II fellowship offers has been adjusted, where necessary, to reflect the resources that were actually available when fellows took up their studies under Type II arrangements. The estimated value of all offers of assistance in kind in support of a given year's technical assistance programme is shown in column (1d) of Table 1. With the introduction of a new "Extrabudgetary funds" column in Table 1, the extrabudgetary funds formerly included in the "In kind" totals have been deducted therefrom, which accounts for the lower totals in the "In kind" column in Table 1 for the years prior to 1977.

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

(a) Experts. The value of the services of each cost-free expert is estimated on the basis of the average salary of an equivalent expert engaged by the Agency and the applicable daily subsistence allowance as established by UNDP, plus the cost of a round-trip air ticket; analogous criteria are used in estimating the value of the services of cost-free and partly cost-free lecturers;

(b) Equipment. The value of equipment is estimated according to the offer made by the donor Government (at the later, "assistance provided" stage, however, the value to the relevant project is based on the actual costs incurred by the donor Government); and

(c) Fellowships. As from 1978, the value of Type II fellowships has been estimated on the basis of pro forma rates established for "average" and "above average" cost countries, multiplied by the duration of the award in months. The estimated travel costs have been added if they were paid by the host country. (Training course stipends and subsistence allowances paid under this heading, however, are based on actual payments.)

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

Assistance provided

3. The financial statistics given in Tables 4, 5A, 5B, 7 and 8 relate, in the first instance, to actual cash payments against 1978 and prior years' obligations (shown according to the year(s) in which the cash payments were made) plus the total value of the assistance in kind (shown according to the year(s) in which it was provided). Thus, the balance of funds - for example, obligated but not spent in 1978 - is not included in the financial data relating to the assistance provided, but is shown separately in column 9 (see, for example, the 1978 entries in Table 4); the total cumulative balance of funds obligated in 1978 and prior years, but not yet spent as at 31 December 1978, is given at the bottom of this column in Tables 4 and 7.

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 and 7). The provision of expert services and equipment in kind has been shown in the same way.

5. 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 and Agency country awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1978 (all notifications of non-acceptance by the proposed host countries and of withdrawals by the nominating countries communicated to the Agency by the close of the year have been taken into account). In Table 6 the number of fellowships classified by nationality does not include awards for short-term training projects and scientific visits, since their inclusion would significantly distort the statistics relating primarily to holders of fellowships of 6-12 months' duration. Although awards for short-term training projects and scientific visits are included in Table 6 under "UNDP" and "Agency" and are financed under "in kind" and "multi-bilateral" arrangements, the regular programme or UNDP, they are not in the same category as Agency or UNDP country awards. Furthermore, in the financial summaries (Tables 7 and 8) the expenditure on, for example, short-term training projects is not shown as assistance to individual countries but to "Intercountry programmes". None of the tables includes any reference to local participants in short-term training projects (see Annex III).

Intercountry programmes

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

Subcontract activities and funds-in-trust arrangements

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

Figures and percentages

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

A. TECHNICAL ASSISTANCE RESOURCES

Table 1

Available resources: 1969-1978
(in thousands of dollars)

Year	Agency				Sub-totals		TOTAL
	Voluntary contributions (1a)	Miscellaneous income (1b)	Extra-budgetary funds (1c)	In kind[a/] (1d)	Agency (1)	UNDP (2)	(1) + (2) (3)
1969	1 333	253	13	658	2 257	1 484	3 741
1970	1 535	214	61	894	2 704	1 469	4 173
1971	2 073	152	218	1 197	3 640	1 839	5 479
1972	2 486	150	60	900	3 596	2 072	5 668
1973	2 847	278	267	1 032	4 424	1 964	6 388
1974	3 085	263	367	1 114	4 829	3 082	7 911
1975	4 219	320	110	1 212	5 861	3 942	9 803
1976	5 062	430	648	1 737	7 877	3 002	10 879
1977	5 448	513	1 899	1 648	9 508	2 144	11 652
1978	6 446	670	2 926	2 104	12 146	2 954	15 100
1969-1978	34 534	3 243	6 569	12 496	56 842	23 952	80 794

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

Table 2

Funds for the Agency's regular programme of technical assistance: 1969-1978
(in thousands of dollars)

Item	1969-74	1975	1976	1977	1978	1969-78
Target for voluntary contributions to the General Fund[a/]	15 500	4 500	5 500	6 000	7 000	38 500
Share of target budgeted for technical assistance	15 103	4 500	5 500	6 000	7 000	38 103
Amount pledged	13 722	4 219	5 062	5 448	6 446	34 897
Actually made available for technical assistance[b/]	14 669	4 539	5 492	5 961	7 116	37 777

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 exceeded the amount pledged.

Table 3

Experts (classified by place of origin) and fellowship awards (classified by place of study): 1978

Place of origin of experts or place of study for fellowship award holders	Experts			Fellowship awards					
				UNDP		Agency			TOTAL
	UNDP	Agency	TOTAL	Country	Regional	Country	Regional	Scientific visits	
Argentina	1	13	14	8	-	3	12	1	24
Australia	-	6	6	-	-	2	-	-	2
Austria	-	7	7	-	-	5	16	1	22
Bangladesh	-	3	3	-	-	-	-	-	-
Belgium	2	3	5	3	-	8	-	1	12
Brazil	-	9	9	2	-	5	12	2	21
Bulgaria	-	-	-	-	-	2	-	-	2
Canada	5	10	15	3	-	10	-	4	17
Chile	1	2	3	1	-	-	-	-	1
China	-	-	-	-	-	-	-	-	-
Cuba	-	-	-	-	-	1	-	-	1
Cyprus	-	-	-	-	-	-	-	-	-
Czechoslovakia	-	3	3	-	-	1	22	4	27
Denmark	3	3	6	5	-	4	-	2	11
Egypt	1	1	2	-	-	1	-	-	1
Finland	-	7	7	-	-	2	-	-	2
France	3	16	19	5	-	18	54	14	91
German D.R.	-	2	2	-	-	1	41	-	42
Germany, F.R.	4	34	38	8	-	18	82	13	121
Greece	-	2	2	-	-	-	-	1	1
Hungary	2	5	7	-	-	7	37	2	46
Iceland	1	-	1	-	-	-	-	-	-
India	1	12	13	-	15	4	-	2	21
Indonesia	-	1	1	-	-	-	-	-	-
Iran	-	1	1	-	-	-	-	-	-
Ireland	-	-	-	-	-	1	16	-	17
Israel	1	2	3	-	-	2	-	2	4
Italy	1	7	8	6	-	8	14	8	36
Japan	1	2	3	1	-	6	-	3	10
Korea, R.	-	2	2	-	-	-	-	-	-
Malaysia	-	-	-	-	-	-	-	1	1
Mexico	1	3	4	-	-	2	-	1	3
Monaco	-	-	-	-	-	1	-	-	1
Netherlands	5	5	10	-	-	5	-	7	12
New Zealand	-	2	2	-	-	-	-	-	-
Nigeria	-	1	1	-	-	-	-	-	-
Norway	-	1	1	-	-	-	-	-	-
Pakistan	-	4	4	-	-	-	-	-	-
Philippines	-	2	2	-	-	1	-	2	3
Poland	-	4	4	-	-	6	-	3	9
Portugal	-	2	2	-	-	-	-	-	-
Romania	-	2	2	-	-	2	-	1	3
Spain	4	12	16	15	-	5	24	3	47
Sri Lanka	-	1	1	-	-	-	-	-	-
Sudan	-	1	1	-	-	-	-	-	-

Place of origin of experts or place of study for fellowship award holders	Experts			Fellowship awards					
				UNDP		Agency			TOTAL
	UNDP	Agency	TOTAL	Country	Regional	Country	Regional	Scientific visits	
Sweden	4	11	15	-	-	8	-	2	10
Switzerland	1	7	8	-	-	3	-	-	3
Thailand	-	-	-	-	-	-	-	-	-
Turkey	-	2	2	-	-	-	-	-	-
USSR	-	-	-	-	-	6	59	2	67
UK	8	18	26	10	-	43	-	5	58
USA	9	38	47	29	-	130	149	15	323
Venezuela	-	-	-	-	-	-	9	-	9
Viet Nam	-	-	-	-	-	-	-	-	-
Yugoslavia	2	8	10	-	-	2	-	2	4
IAEA	11	83	94	6	-	7	-	8	21
Other international organizations	2	7	9	8	-	-	-	-	8
TOTAL	74	367	441	110	15	330	547	112	1 114[a/]

a/ The difference between the number of awards (900) and the number of places of study (1114) is due to the fact that a number of fellows, study tour participants and holders of awards for scientific visits went to more than one place of study.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1969-1978
(in thousands of dollars)

TYPE	Experts		Visiting professors/ Missions		Equipment		Fellowships		Scientific visits		Intercountry projects		Sub-contracts		TOTAL		Assistance outstanding at 31 December 1978		TOTAL (8) + (9) + (10)
																	Unliquidated obligations	In kind balance[a/]	
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	(10)	(11)
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	$	$
1969-1974																			
UNDP funds	4 700.8	39.5	-	-	4 142.3	34.8	1 108.6	9.3	-	-	1 283.5	10.8	674.9	5.6	11 910.1	100.0	-	-	11 910.1
Agency funds	4 600.1	35.5	345.4	2.6	3 924.7	30.3	2 758.1	21.3	237.5	1.8	1 100.9	8.5	-	-	12 966.7	100.0	-	-	12 966.7
Assistance in kind[a/]	118.1	2.0	-	-	1 428.3	25.0	3 685.3	64.5	-	-	484.4	8.5	-	-	5 716.1	100.0	-	-	5 716.1
TOTAL	9 419.0	30.8	345.4	1.1	9 495.3	31.0	7 552.0	24.7	237.5	0.8	2 868.8	9.4	674.9	2.2	30 592.9	100.0	-	-	30 592.9
1975																			
UNDP funds	1 568.1	39.8	-	-	1 150.4	29.2	379.9	9.6	-	-	237.5	6.0	605.6	15 4	3 941.5	100.0	-	-	3 941.5
Agency funds	957.3	28.0	36.1	1.1	1 337.5	39.1	761.6	22.2	76.5	2.2	254.5	7.4	-	-	3 423.5	100.0	-	-	3 423.5
Assistance in kind[a/]	48.6	4.1	-	-	254.6	21.3	747.3	62.5	-	-	144.7	12.1	-	-	1 195.2	100.0	-	-	1 195.2
TOTAL	2 574.0	30.1	36.1	0.4	2 742.5	32.0	1 888.8	22.1	76.5	0.9	636.7	7.4	605.6	7.1	8 560.2	100.0	-	-	8 560.2
1976																			
UNDP funds	1 259.6	42.0	-	-	913.6	30.4	368.5	12.3	-	-	148.0	4.9	312.6	10.4	3 002.3	100.0	-	-	3 002.3
Agency funds	1 231.6	31.1	2.8	0.1	1 340.9	33.9	722.5	18.3	99.6	2.5	557.3	14.1	-	-	3 954.7	100.0	-	-	3 954.7
Assistance in kind[a/]	84.1	6,1	-	-	400,9	29.0	836.3	60.6	-	-	59.0	4.3	-	-	1 380.3	100.0	-	-	1 380.3
TOTAL	2 575.3	30.9	2.8	0.0	2 655.4	31.9	1 927.3	23.1	99.6	1.2	764.3	9.2	312.6	3.7	8 337.3	100.0	-	-	8 337.3
1977																			
UNDP funds	1 005.5	46.9	-	-	720.6	33.6	237.8	11.1	-	-	22.0	1.0	158.5	7.4	2 144.4	100.0	-	-	2 144.4
Agency funds	1 820.5	36.4	20.9	0.4	1 656.6	33.2	675.8	13.5	114.5	2.3	708.8	14.2	-	-	4 997.1	100.0	-	-	4 997.1
Extrabudgetary funds	107.2	17.8	-	-	149.3	24.8	118.7	19.7	0.2	0.0	227.0	37.7	-	-	602.4	100.0	-	-	602.4
Assistance in kind[a/]	16.9	1.3	-	-	273.9	21.3	924.6	72.0	3.4	0.3	65.5	5.1	-	-	1 284.3	100.0	-	-	1 284.3
TOTAL	2 950.1	32.7	20.9	0.2	2 800.4	31.0	1 956.9	21.7	118.1	1.3	1 023.3	11.3	158.5	1.8	9 028.2	100.0	-	-	9 028.2
1978																			
UNDP funds	1 182.5	40.0	-	-	1 268.6	43.0	341.7	11.6	-	-	36.5	1.2	124.7	4.2	2 954.0	100.0	942.5	-	3 896.5
Agency funds	1 843.4	28.2	19.5	0.3	2 978.5	45.6	704.8	10.8	101.9	1.6	879.4	13.5	-	-	6 527.5	100.0	3 469.9	-	9 997.4
Extrabudgetary funds	236.1	15.3	-	-	998.5	64.9	135.3	8.8	4.6	0.3	164.7	10.7	-	-	1 539.2	100.0	665.4	-	2 204.6
Assistance in kind[a/]	22.0	1.1	-	-	51.4	2.6	1 685.4	84.8	7.3	0.4	220.7	11.1	-	-	1 986.8	100.0	-	1 734.7	3 721.5
TOTAL	3 284.0	25.2	19.5	0.2	5 297.0	40.7	2 867.2	22.0	113.8	0.9	1 301.3	10.0	124.7	1.0	13 007.5	100.0	5 077.8	1 734.7	19 820.0
1969-1978																			
UNDP funds	9 716.5	40.6	-	-	8 195.5	34.2	2 436.5	10.2	-	-	1 727.5	7.2	1 876.3	7.8	23 952.3	100.0	942.5	-	24 894.8
Agency funds	10 452.9	32.8	424.7	1.3	11 238.2	35.3	5 622.8	17.6	630.0	2.0	3 500.9	11.0	-	-	31 869.5	100.0	3 469.9	-	35 339.4
Extrabudgetary funds	343.3	16.0	-	-	1 147.8	53.6	254.0	11.9	4.8	0.2	391.7	18.3	-	-	2 141.6	100.0	665.4	-	2 807.0
Assistance in kind[a/]	289.7	2.5	-	-	2 409.1	20.8	7 878.9	68.2	10.7	0.1	974.3	8.4	-	-	11 562.7	100.0	-	1 734.7	13 297.4
GRAND TOTAL	20 802.4	29.9	424.7	0.6	22 990.6	33.1	16 192.2	23.3	645.5	0.9	6 594.4	9.5	1 876.3	2.7	69 526.1	100.0	5 077.8	1 734.7	76 338.6

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

Table 5A

Status of monetary resources and expenditures for the Agency's regular programme of technical assistance as at 31 December 1978 (in thousands of dollars)

Programme year	Monetary resources made available	Year of expenditure											Total expenditures 1958-1978	Unliquidated obligations	Unobligated earmarkings	Programme savings (deficit)
		1958-68	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978				
1958-1968	11671	9263	1056	389	201	49	10	-	-	-	-	-	10968	-	-	703
1969	1586	-	522	606	243	125	7	1	2	-	-	-	1506	-	-	80
1970	1749	-	-	624	775	405	144	23	23	3	1	-	1998	-	-	(249)
1971	2225	-	-	-	905	1144	364	82	32	22	31	-	2580	-	-	(355)
1972	2636	-	-	-	-	833	1193	458	167	70	38	2	2761	-	37	(162)
1973	3125	-	-	-	-	-	958	1114	616	229	102	45	3064	17	29	15
1974	3348	-	-	-	-	-	-	735	1373	657	287	93	3145	16	251	(64)
1975	4539	-	-	-	-	-	-	-	1211	1474	850	359	3894	41	478	126
1976	5492	-	-	-	-	-	-	-	-	1500	1917	1141	4558	336	668	(70)
1977	5961	-	-	-	-	-	-	-	-	-	1771	2292	4063	900	1038	(40)
1978	7116	-	-	-	-	-	-	-	-	-	-	2595	2595	2160	2300	61
TOTAL	49448	9263	1578	1619	2124	2556	2676	2413	3424	3955	4997	6527	41132	3470	4801	45[a/]

a/ The $45 000 overall programme savings are the difference between the unobligated balance in Operating Fund II of $4 846 000 (see Statement III. A of the Agency's Accounts for 1978) and total earmarkings of $4 801 000 (amounts which have not yet been obligated but are needed for approved projects).

Table 5B

Status of extrabudgetary funds and expenditures for the Agency's technical assistance activities as at 31 December 1978
(in thousands of dollars)

Programme year	Extrabudgetary funds made available	Year of expenditure											Total expenditures 1958-1978	Unliquidated obligations	Unobligated balance
		1958-1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978			
1958-1968	134	50	10	37	20	17	-	-	-	-	-	-	134	-	-
1969	13	-	3	9	-	1	-	-	-	-	-	-	13	-	-
1970	61	-	-	30	23	8	-	-	-	-	-	-	61	-	-
1971	218	-	-	-	17	49	9	21	18	9	22	5	150	1	67
1972	60	-	-	-	-	11	25	7	-	-	-	-	43	-	17
1973	267	-	-	-	-	-	53	79	96	4	19	-	251	-	16
1974	367	-	-	-	-	-	-	63	102	173	12	19	369	-	(2)
1975	110	-	-	-	-	-	-	-	37	10	59	-	106	-	4
1976	648	-	-	-	-	-	-	-	-	162	197	197	556	32	60
1977	1 899	-	-	-	-	-	-	-	-	-	293	784	1 077	273	549
1978	2 926[a/]	-	-	-	-	-	-	-	-	-	-	535	535	360	2 031
TOTAL	6 703	50	13	76	60	86	87	170	253	358	602	1 540	3 295	666	2 742

a/ Does not include funds totalling $424 924 which were received in 1978 in respect of technical assistance activities programmed for 1979-80, namely, $66 000 from Belgium, $85 470 from Canada and $273 454 from the Federal Republic of Germany.

Table 6

Recipients of expert services and fellowship awards: 1978

RECIPIENT	Number of expert assignments, classified by location of duty station						Number of fellowship awards, classified by nationality of award holder					
	UNDP		Agency		TOTAL		UNDP		Agency		TOTAL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Afghanistan	-	-	5	20	5	20	-	-	3	24	3	24
Albania	-	-	-	-	-	-	4	12	-	-	4	12
Argentina	7	39	12	12	19	51	3	2	11	89	14	91
Bangladesh	1	1	16	25	17	26	-	-	21	178	21	178
Bolivia	-	-	5	17	5	17	-	-	-	-	-	-
Brazil	15	42	18	62	33	104	6	34	3	25	9	59
Bulgaria	2	1	-	-	2	1	-	-	9	63	9	63
Burma	-	-	1	7	1	7	-	-	1	12	1	12
Chile	10	45	3	3	13	48	24	251	10	67	34	318
Colombia	2	3	1	1	3	4	-	-	10	102	10	102
Costa Rica	-	-	6	19	6	19	-	-	-	-	-	-
Cuba	-	-	-	-	-	-	-	-	2	18	2	18
Czechoslovakia	-	-	-	-	-	-	-	-	11	104	11	104
Dem. P. R. Korea	-	-	1	1	1	1	-	-	2	12	2	12
Ecuador	-	-	4	25	4	25	-	-	2	24	2	24
Egypt	1	1	6	12	7	13	1	1	10	112	11	113
El Salvador	-	-	2	2	2	2	-	-	-	-	-	-
Ethiopia	1	5	1	7	2	12	-	-	-	-	-	-
Ghana	-	-	3	10	3	10	3	21	14	157	17	178
Greece	-	-	4	5	4	5	-	-	4	48	4	48
Guatemala	-	-	4	5	4	5	-	-	-	-	-	-
Hong Kong	-	-	1	1	1	1	-	-	-	-	-	-
Hungary	-	-	1	1	1	1	3	1	7	51	10	52
Iceland	-	-	4	2	4	2	-	-	-	-	-	-
India	-	-	4	1	4	1	-	-	19	152	19	152
Indonesia	1	1	12	19	13	20	2	1	-	-	2	1
Iran	-	-	1	1	1	1	-	-	9	56	9	56
Iraq	-	-	-	-	-	-	-	-	4	30	4	30
Israel	-	-	2	1	2	1	-	-	4	18	4	18
Ivory Coast	-	-	4	8	4	8	-	-	1	8	1	8
Jordan	-	-	3	15	3	15	-	-	1	12	1	12
Kenya	1	1	2	3	3	4	-	-	2	24	2	24
Korea, R.	-	-	4	6	4	6	-	-	13	109	13	109
Lebanon	-	-	-	-	-	-	-	-	1	12	1	12
Libyan A. J.	-	-	1	3	1	3	-	-	1	12	1	12
Madagascar	-	-	3	6	3	6	-	-	-	-	-	-
Malaysia	-	-	12	17	12	17	-	-	12	69	12	69
Mali	-	-	3	13	3	13	-	-	2	24	2	24
Mauritius	-	-	-	-	-	-	-	-	1	6	1	6
Mexico	-	-	12	21	12	21	-	-	1	6	1	6
Mongolia	-	-	2	3	2	3	-	-	-	-	-	-
Morocco	4	23	4	23	8	46	-	-	5	15	5	15
Nicaragua	-	-	2	3	2	3	-	-	-	-	-	-
Niger	-	-	3	1	3	1	-	-	-	-	-	-
Nigeria	3	24	5	14	8	38	1	12	2	24	3	36
Pakistan	2	14	7	5	9	19	4	24	13	131	17	155
Panama	-	-	-	-	-	-	-	-	4	33	4	33
Paraguay	-	-	4	7	4	7	-	-	1	2	1	2
Peru	3	33	10	26	13	59	7	20	3	20	10	40
Philippines	1	8	4	23	5	31	7	18	11	93	18	111
Poland	-	-	1	1	1	1	-	-	11	106	11	106
Portugal	-	-	4	3	4	3	-	-	5	16	5	16
Romania	8	2	1	2	9	4	18	12	1	3	19	15
St. Kitts	-	-	-	-	-	-	-	-	1	12	1	12
Saudi Arabia	-	-	2	1	2	1	-	-	1	3	1	3

RECIPIENT	Number of expert assignments, classified by location of duty station						Number of fellowship awards, classified by nationality of award holder					
	UNDP		Agency		TOTAL		UNDP		Agency		TOTAL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Senegal	-	-	3	7	3	7	-	-	5	47	5	47
Spain	-	-	2	22	2	22	-	-	-	-	-	-
Sri Lanka	2	1	10	13	12	14	1	7	10	97	11	104
Sudan	-	-	3	3	3	3	-	-	8	78	8	78
Syrian A.R.	2	1	-	-	2	1	-	-	1	12	1	12
Thailand	-	-	4	3	4	3	-	-	12	109	12	109
Turkey	2	1	16	9	18	10	-	-	14	143	14	143
Uganda	-	-	1	12	1	12	-	-	-	-	-	-
U.R. Cameroon	-	-	1	2	1	2	-	-	-	-	-	-
U.R. Tanzania	-	-	4	5	4	5	-	-	-	-	-	-
Uruguay	-	-	7	10	7	10	-	-	2	24	2	24
Venezuela	-	-	1	12	1	12	-	-	-	-	-	-
Yugoslavia	6	4	4	4	10	8	3	2	6	54	9	56
Zaire	-	-	3	7	3	7	-	-	4	48	4	48
Zambia	-	-	4	2	4	2	-	-	3	36	3	36
Sub-total	74	250	273	574	347	824	87	418	314	2 730	401	3 148
Intercountry programmes	-	-	5	20	5	20	-	-	-	-	-	-
Short-term training projects	2	2	183	72	185	74	15	7	435	728	450	735
Scientific visits	-	-	-	-	-	-	-	-	49	42	49	42
Sub-total	2	2	188	92	190	94	15	7	484	770	499	777
GRAND TOTAL	76	252	461	666	537[a/]	918	102	425	798	3 500	900	3 925

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

a/ The difference between the number of assignments (537) and the number of experts (441) is due to the fact that a number of experts served in more than one country.

Table 7

Financial summary: 1978
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1978		TOTAL (8) + (9) + (10)
	Experts	Equipment	Fellowships	TOTAL	UNDP	Agency	Extra-budgetary funds	In kind[a/]	TOTAL	Unliquidated obligations	In kind balance	
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)	(10)	(11)
Afghanistan	69,7	41,3	5,7	116,7	-	111,9	-	4,8	116,7	55,9	15,0	187,6
Albania	1,7	4,1	8,1	13,9	9,8	4,1	-	-	13,9	40,0	-	53,9
Algeria	-	24,4	-	24,4	-	24,4	-	-	24,4	-	-	24,4
Argentina	260,4	166,5	123,8	550,7	385,8	115,1	-	49,8	550,7	56,0	58,3	665,0
Bangladesh	26,5	111,4	64,2	202,1	35,8	115,2	5,2	45,9	202,1	75,7	80,4	358,2
Bolivia	62,2	70,6	6,3	139,1	-	120,8	18,3	-	139,1	32,0	-	171,1
Brazil	400,4	572,3	101,9	1 074,6	787,2	222,5	-	64,9	1 074,6	69,2	20,4	1 164,2
Bulgaria	3,8	16,1	42,9	62,8	6,4	44,5	-	11,9	62,8	144,2	7,7	214,7
Burma	22,8	54,3	19,0	96,1	-	96,1	-	-	96,1	20,7	18,0	134,8
Chile	236,2	215,9	200,2	652,3	517,3	102,0	-	33,0	652,3	230,2	45,2	927,7
Colombia	12,6	63,5	23,4	99,5	24,8	40,9	-	33,8	99,5	99,8	86,0	285,3
Costa Rica	65,2	38,9	2,5	106,6	-	82,8	22,4	1,4	106,6	145,4	-	252,0
Cuba	4,7	139,0	30,2	173,9	5,5	147,2	15,6	5,6	173,9	63,6	8,4	245,9
Cyprus	-	13,5	-	13,5	-	1,1	-	12,4	13,5	-	-	13,5
Czechoslovakia	-	-	43,1	43,1	-	16,5	-	26,6	43,1	60,3	32,9	136,3
Dem. P.R. Korea	1,1	1,5	2,8	5,4	-	2,6	-	2,8	5,4	51,3	9,8	66,5
Ecuador	85,0	62,8	10,4	158,2	-	89,6	59,4	9,2	158,2	11,0	23,8	193,0
Egypt	47,1	164,6	116,6	328,3	56,9	191,2	-	80,2	328,3	338,8	80,8	747,9
El Salvador	9,0	3,2	-	12,2	-	9,0	3,2	-	12,2	17,7	-	29,9
Ethiopia	54,2	0,9	2,1	57,2	30,4	26,8	-	-	57,2	5,8	-	63,0
Ghana	37,5	139,7	161,1	338,3	11,1	100,2	103,6	123,4	338,3	117,0	143,5	598,8
Greece	24,6	34,8	82,3	141,7	18,3	30,9	16,2	76,3	141,7	51,9	52,5	246,1
Guatemala	14,9	3,9	-	18,8	-	17,6	1 2	-	18,8	5,5	-	24,3
Hong Kong	6,3	5,1	-	11,4	-	11,4	-	-	11,4	-	-	11,4
Hungary	1,0	203,8	60,2	265,0	21,6	230,3	-	13,1	265,0	116,2	7,9	389,1
Iceland	7,0	16,4	-	23,4	-	23,4	-	-	23,4	16,8	-	40,2
India	4,0	91,9	191,1	287,0	-	150,9	16,0	120,1	287,0	112,7	82,1	481,8
Indonesia	79,4	86,8	26,6	192,8	8,1	158,2	4,1	22,4	192,8	56,4	14,4	263,6
Iran	9,8	-	7,8	17,6	-	13,4	-	4,2	17,6	29,9	24,6	72,1
Iraq	-	150,0	15,9	165,9	-	150,8	2,5	12,6	165,9	36,4	4,2	206,5
Israel	3,3	56,7	43,3	103,3	-	54,4	-	48,9	103,3	11,0	6,0	120,3
Ivory Coast	28,4	26,8	2,0	57,2	-	39,4	17,8	-	57,2	6,5	-	63,7
Jamaica	-	30,5	-	30,5	-	30,5	-	-	30,5	-	-	30,5
Jordan	63,3	85,6	30,0	178,9	-	84,3	64,6	30,0	178,9	42,1	8,4	229,4
Kenya	15,3	38,1	8,5	61,9	5,8	47,5	7,2	1,4	61,9	5,9	7,0	74,8
Korea, R.	40,6	59,3	170,4	270,3	-	74,9	50,3	145,1	270,3	73,6	75,9	419,8
Lebanon	-	-	3,0	3,0	-	-	3,0	-	3,0	7,4	-	10,4
Libyan A.J.	17,3	-	21,5	38,8	-	24,4	-	14,4	38,8	59,3	7,2	105,3
Madagascar	23,1	22,7	0,1	45,9	-	32,1	13,8	-	45,9	15,0	-	60,9
Malaysia	73,2	36,9	97,8	207,9	-	127,8	25,9	54,2	207,9	58,7	6,0	272,6
Mali	57,4	43,7	4,2	105,3	-	101,1	-	4,2	105,3	4,5	12,6	122,4
Mauritius	-	-	1,1	1,1	-	-	1,1	-	1,1	4,3	-	5,4
Mexico	65,0	79,9	16,4	161,3	-	90,8	62,1	8,4	161,3	59,7	-	221,0
Mongolia	15,0	75,8	9,2	100,0	-	90,8	3,6	5,6	100,0	110,9	-	210,9
Morocco	153,8	84,9	19,4	258,1	136,0	68,7	37,3	16,1	258,1	39,8	1,4	299,3
Nicaragua	12,6	-	-	12,6	-	12,6	-	-	12,6	0,7	-	13,3
Niger	4,2	9,0	-	13,2	-	13,2	-	-	13,2	12,4	-	25,6
Nigeria	104,1	85,4	50,0	239,5	122,5	17,0	61,6	38,4	239,5	73,6	57,6	370,7
Pakistan	72,2	265,9	241,6	579,7	91,2	357,2	2,9	128,4	579,7	142,2	127,3	849,2
Panama	-	1,6	1,3	2,9	-	2,9	-	-	2,9	8,5	32,4	43,8
Paraguay	26,5	50,7	2,8	80,0	-	26,7	50,7	2,6	80,0	4,4	0,7	85,1
Peru	243,5	170,8	58,0	472,3	292,7	120,6	18,2	40,8	472,3	114,7	61,4	648,4
Philippines	138,5	96,0	170,5	405,0	48,5	109,3	133,6	113,6	405,0	94,8	107,9	607,7
Poland	2,0	32,1	46,6	80,7	-	53,5	-	27,2	80,7	31,4	58,3	170,4
Portugal	9,3	-	11,8	21,1	-	13,8	-	7,3	21,1	76,8	3,6	101,5
Romania	85,3	432,2	13,6	531,1	136,6	392,4	-	2,1	531,1	140,0	-	671,1
St. Kitts	-	-	4,2	4,2	-	-	4,2	-	4,2	6,2	-	10,4
Saudi Arabia	9,3	-	2,3	11,6	-	11,6	-	-	11,6	1,0	-	12,6
Senegal	23,8	100,1	21,0	144,9	-	57,4	78,4	9,1	144,9	28,4	11,9	185,2
Singapore	1,2	71,5	-	72,7	-	72,7	-	-	72,7	3,8	-	76,5

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1978		TOTAL (8) + (9) + (10)
	Experts	Equipment	Fellowships	TOTAL	UNDP	Agency	Extra-budgetary funds	In kind a/	TOTAL	Unliquidated obligations	In kind balance	
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)	(9)	(10)	(11)
Spain	74,2	-	0,8	75,0	-	75,0	-	-	75.0	6,0	-	81.0
Sri Lanka	37.8	73,6	116,7	228,1	20,2	142,6	17,0	48,3	228.1	199,6	65,7	493.4
Sudan	9,7	70.5	51,8	132,0	5,1	102,1	6,0	18.8	132,0	64,4	12,4	208.8
Syrian A.R.	5,6	1,6	18,5	25,7	7,4	15,1	3,2	-	25.7	19,5	-	45.2
Thailand	11.2	104,7	120,0	235.9	-	39.5	111.2	85.2	235.9	80,6	103.2	419.7
Tunisia	2.1	19.6	-	21.7	-	21,7	-	-	21.7	-	-	21.7
Turkey	31.1	17.5	148.1	196.7	21.6	71.0	1.7	102.4	196.7	41.7	115.7	354,1
Uganda	44.2	67.0	4,3	115.5	-	115.5	-	-	115.5	8.8	-	124.3
U.R. Cameroon	6.6	19.6	-	26.2	-	6.6	19.6	-	26.2	5.6	-	31.8
U.R. Tanzania	19.9	71.7	-	91.6	-	91,6	-	-	91.6	14.5	-	106.1
Uruguay	40.4	54.5	5.9	100.8	-	82.4	16.3	2.1	100.8	45.3	6.3	152.4
Venezuela	38.5	-	0.7	39.2	-	39,2	-	-	39.2	5.2	-	44.4
Yugoslavia	33.6	216.8	44.6	295.0	110.9	104.4	60.2	19.5	295.0	146.0	2.4	443.4
Zaire	30.8	31.4	34.1	96.3	-	76.7	-	19.6	96.3	21.7	20.3	138.3
Zambia	11.3	46.5	18.0	75.8	-	57.8	-	18.0	75.8	56.3	7.2	139.3
Sub-total	3 232.3	5 248,4	2 962.3	11 443.0	2 917.5	5 620.2	1 139.2	1 766.1	11 443.0	4 013.2	1 734.7	17 190.9
Intercountry programmes:												
Asia and the Pacific	105.4	3.2	55.4	164.0	36.5	124.4	0.1	3.0	164.0	17.5	-	181.5
Latin America	39.0	17.7	5.8	62.5	-	31.1	12.8	18.6	62.5	2.3	-	64.8
Interregional	369.8	82.2	622.8	1 074.8	-	723.9	151.8	199.1	1 074.8	990.6	-	2 065.4
Sub-total	514.2	103.1	684.0	1 301.3	36.5	879.4	164.7	220.7	1 301.3	1 010.4	-	2 311.7
SIDA large-scale assistance												
Bangladesh	76.1	74.1	17.8	168.0	-	-	168.0	-	168.0	51.9	-	219.9
India	2.9	-	-	2.9	-	-	2.9	-	2.9	0.2	-	3.1
Other multi-bilateral assistance												
Nigeria	48.4	16.0	-	64.4	-	-	64.4	-	64.4	2.1	-	66.5
Miscellaneous	10.4	16.6	0.9	27.9	-	27.9	-	-	27.9	-	-	27.9
GRAND TOTAL	3 884.3	5 458.2	3 665.0	13 007.5	2 954.0	6 527.5	1 539.2	1 986.8	13 007.5	5 077.8	1 734.7	19 820.0

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

Table 8

Financial summary 1958-1978
(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source				
	Experts	Equipment	Fellowships	TOTAL	UNDP	Agency	Extra-budgetary funds[a]	In kind[b]	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)
Afghanistan	214.4	142.1	74.4	430.9	92.9	276.1	-	61.9	430.9
Albania	25.7	220.7	35.4	281.8	113.8	153.5	-	14.5	281.8
Algeria	24.8	24.4	75.1	124.3	21.7	92.5	-	10.1	124.3
Argentina	1 413.1	871.3	899.7	3 184.1	1 478.5	1 254.4	-	451.2	3 184.1
Austria	62.0	13.8	120.7	196.5	-	132.6	-	63.9	196.5
Bangladesh	85.4	261.9	393.3	740.6	35.8	428.3	15.5	261.0	740.6
Bolivia	212.5	266.1	152.9	631.5	153.4	365.5	20.2	92.4	631.5
Brazil	2 266.1	1 481.1	929.0	4 676.2	2 974.6	1 262.7	-	438.9	4 676.2
Bulgaria	43.5	343.5	660.2	1 047.2	80.5	672.1	-	294.6	1 047.2
Burma	614.7	428.3	168.0	1 211.0	537.0	595.0	-	79.0	1 211.0
Chile	1 403.3	1 049.9	646.6	3 099.8	2 185.2	694.0	-	220.6	3 099.8
China	229.7	166.2	554.9	950.8	281.5	307.7	-	361.6	950.8
Colombia	337.8	394.5	236.4	968.7	156.8	482.0	-	329.9	968.7
Costa Rica	206.4	167.8	69.2	443.4	-	310.4	22.4	110.6	443.4
Cuba	134.3	520.8	86.8	741.9	52.0	612.8	19.2	57.9	741.9
Cyprus	70.6	131.1	43.3	245.0	24.1	172.7	-	48.2	245.0
Czechoslovakia	-	-	599.4	599.4	6.2	310.7	-	282.5	599.4
Dem. Kampuchea	85.0	29.3	1.7	116.0	39.1	69.6	-	7.3	116.0
Dominican Republic	-	-	2.8	2.8	-	-	-	2.8	2.8
Dem. P.R. Korea	1.1	1.5	2.8	5.4	-	2.6	-	2.8	5.4
Ecuador	193.0	213.6	83.0	489.6	35.5	271.4	72.4	110.3	489.6
Egypt	468.7	995.6	1 196.3	2 660.6	743.4	1 129.0	4.9	783.3	2 660.6
El Salvador	50.1	53.7	22.3	126.1	14.1	39.1	3.2	69.7	126.1
Ethiopia	213.9	76.6	58.3	348.8	103.6	211.9	-	33.3	348.8
Gabon	3.7	-	-	3.7	-	3.7	-	-	3.7
Ghana	351.8	466.2	522.4	1 340.4	238.1	658.9	108.1	335.3	1 340.4
Greece	1 536.2	411.2	776.4	2 723.8	1 377.5	842.4	36.1	467.8	2 723.8
Guatemala	84.1	126.1	35.8	246.0	56.2	98.1	6.7	85.0	246.0
Haiti	0.9	-	-	0.9	-	0.9	-	-	0.9
Hong Kong	59.9	102.0	20.6	182.5	-	173.5	-	9.0	182.5
Hungary	86.1	1 208.7	769.1	2 063.9	614.6	1 194.2	-	255.1	2 063.9
Iceland	38.7	189.9	41.6	270.2	-	207.1	-	63.1	270.2
India	808.7	2 026.5	1 837.4	4 672.6	2 636.5	1 092.5	21.2	922.4	4 672.6
Indonesia	876.4	589.1	761.1	2 226.6	473.7	1 203.0	17.7	532.2	2 226.6
Iran	639.0	72.0	429.3	1 140.3	455.4	425.1	-	259.8	1 140.3
Iraq	357.7	630.8	622.0	1 610.5	242.5	1 022.2	10.5	335.3	1 610.5
Israel	242.2	602.5	337.8	1 182.5	170.9	675.9	-	335.7	1 182.5
Ivory Coast	107.6	71.0	4.9	183.5	73.4	92.3	17.8	-	183.5
Jamaica	100.0	104.7	24.0	228.7	10.4	147.5	-	70.8	228.7
Jordan	231.8	147.4	112.0	491.2	89.3	284.2	64.6	53.1	491.2
Kenya	103.0	153.1	60.7	316.8	33.2	202.6	7.2	73.8	316.8
Korea, R.	715.5	664.2	1 167.2	2 546.9	566.8	1 111.5	50.3	818.3	2 546.9
Kuwait	12.0	-	3.9	15.9	-	15.9	-	-	15.9
Lebanon	247.8	140.7	68.3	456.8	139.3	291.3	3.0	23.2	456.8
Liberia	115.2	29.0	-	144.2	60.2	27.7	-	56.3	144.2
Libyan A.J.	88.3	53.5	27.7	169.5	-	150.0	-	19.5	169.5
Madagascar	101.9	92.5	24.8	219.2	-	205.4	13.8	-	219.2
Malaysia	208.2	142.1	228.5	578.8	1.6	357.7	27.1	192.4	578.8
Mali	245.2	88.2	6.4	339.8	13.4	320.5	-	5.9	339.8
Mauritius	3.3	-	1.1	4.4	-	3.3	1.1	-	4.4

RECIPIENT	Assistance provided, by type				Assistance provided, by source				
	Experts	Equipment	Fellowships	TOTAL	UNDP	Agency	Extra-budgetary funds[a]	In kind[b]	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)
Mexico	920,7	360,7	314,8	1 596,2	419,3	925,9	64,9	186,1	1 596,2
Mongolia	37,7	181,3	17,2	236,2	-	219,0	10,6	6,6	236,2
Morocco	799,0	575,2	182,0	1 556,2	787,8	545,2	63,4	159,8	1 556,2
Nicaragua	26,5	7,6	20,1	54,2	-	54,2	-	-	54,2
Niger	6,5	9,0	-	15,5	-	15,5	-	-	15,5
Nigeria	542,8	250,1	164,0	956,9	376,6	405,0	68,1	107,2	956,9
Pakistan	1 347,0	1 380,9	1 218,3	3 946,2	1 834,0	1 424,1	8,8	679,3	3 946,2
Panama	65,1	12,7	30,3	108,1	4,1	75,0	-	29,0	108,1
Paraguay	37,7	75,1	38,5	151,3	-	62,5	70,5	18,3	151,3
Peru	735,8	477,4	200,1	1 413,3	510,7	625,9	18,2	258,5	1 413,3
Philippines	717,2	1 096,3	1 377,2	3 190,7	950,3	1 068,2	154,9	1 017,3	3 190,7
Poland	34,4	370,5	1 042,2	1 447,1	199,7	872,0	-	375,4	1 447,1
Portugal	75,2	70,0	59,3	204,5	-	145,0	-	59,5	204,5
Romania	477,4	1 601,9	661,4	2 740,7	1 430,8	1 112,1	-	197,8	2 740,7
St. Kitts	-	-	4,2	4,2	-	-	4,2	-	4,2
Saudi Arabia	28,1	2,9	12,8	43,8	-	36,8	-	7,0	43,8
Senegal	148,4	261,6	44,5	454,5	86,5	267,1	78,4	22,5	454,5
Sierra Leone	212,3	53,4	36,4	302,1	174,5	58,8	-	68,8	302,1
Singapore	128,9	288,3	44,4	461,6	-	408,8	-	52,8	461,6
Somalia	6,3	-	-	6,3	6,3	-	-	-	6,3
Spain	99,3	-	61,9	161,2	-	138,1	-	23,1	161,2
Sri Lanka	390,7	440,9	313,0	1 144,6	144,8	787,5	22,0	190,3	1 144,6
Sudan	368,9	352,6	360,4	1 081,9	295,3	659,1	23,3	104,2	1 081,9
Syrian A.R.	102,9	200,2	225,8	528,9	192,5	262,1	4,5	69,8	528,9
Thailand	929,2	519,2	1 202,9	2 651,3	545,5	1 151,7	122,8	831,3	2 651,3
Tunisia	290,1	172,6	149,3	612,0	141,2	404,6	-	66,2	612,0
Turkey	1 194,6	927,3	1 074,1	3 196,0	1 616,4	903,5	1,7	674,4	3 196,0
Uganda	252,8	192,6	33,3	478,7	131,0	340,6	-	7,1	478,7
U.R. Cameroon	289,1	117,5	44,2	450,8	297,3	127,1	19,6	6,8	450,8
U.R. Tanzania	28,0	71,7	2,8	102,5	9,6	92,9	-	-	102,5
Uruguay	220,7	539,7	112,3	872,7	173,6	475,4	37,2	186,5	872,7
Venezuela	311,3	96,4	215,5	623,2	130,7	311,0	-	181,5	623,2
Viet Nam	74,4	143,8	141,6	359,8	31,4	173,2	-	155,2	359,8
Yugoslavia	511,7	1 304,0	1 038,8	2 854,5	1 612,0	827,0	70,5	345,0	2 854,5
Zaire	303,3	150,7	187,6	641,6	9,6	505,1	1,3	125,6	641,6
Zambia	304,9	126,0	47,1	478,0	152,5	283,0	0,1	42,4	478,0
Other countries[c]	74,7	19,4	778,6	872,7	77,0	376,6	-	419,1	872,7
Sub-total	27 814,9	28 414,7	26 452,4	82 682,0	28 723,7	36 793,6	1 388,0	15 776,7	82 682,0
Intercountry programmes:									
Africa	124,1	77,4	98,8	300,3	289,7	5,7	-	4,9	300,3
Asia and the Pacific	543,7	128,7	365,9	1 038,3	641,4	306,6	1,3	89,0	1 038,3
Europe	21,0	18,6	17,3	56,9	56,9	-	-	-	56,9
Latin America	760,3	750,5	208,6	1 719,4	1 458,2	85,1	109,2	66,9	1 719,4
Middle East	5,8	1,2	5,3	12,3	12,3	-	-	-	12,3
Interregional	1 547,0	589,2	4 183,9	6 320,1	1 441,0	3 755,3	281,2	842,6	6 320,1
Sub-total	3 001,9	1 565,6	4 879,8	9 447,3	3 899,5	4 152,7	391,7	1 003,4	9 447,3

RECIPIENT	Assistance provided, by type				Assistance provided, by source				
	Experts	Equipment	Fellowships	TOTAL	UNDP	Agency	Extra-budgetary funds[a/]	In kind[b/]	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)	(8)
				SIDA large-scale assistance					
Bangladesh	196.9	372.7	66.8	636.4	-	-	284.4	352.0	636.4
India	2.9	-	-	2.9	-	-	2.9	-	2.9
				Other multi-bilateral assistance					
Nigeria	58.6	16.0	-	74.6	-	-	74.6	-	74.6
Miscellaneous	137.5	66.9	4.6	209.0	23.2	185.8	-	-	209.0
GRAND TOTAL	31 212.7	30 435.9	31 403.6	93 052.2	32 646.4	41 132.1	2 141.6	17 132.1	93 052.2

a/ For 1977 and 1978; the assistance provided from extrabudgetary funds in earlier years is included under assistance in kind.

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

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

ANNEX II

EXTRABUDGETARY ASSISTANCE FOR AGENCY TECHNICAL CO-OPERATION PROGRAMMES

A. Assistance provided from special cash contributions

Donor	Assistance provided	Expenditure $
Belgium	Two experts and equipment for one project	15 100
Canada	Two experts and equipment for five projects in five countries	156 000
Germany, F.R.	Three experts, equipment for one project, and a contribution towards meeting the cost of a training course	64 300
Japan	Equipment for one project	3 600
Netherlands	One associate expert	20 100
Sweden	Twelve experts, equipment for one project, training for 36 fellows, defrayal of the cost of one training course and of one scientific visitor	421 600[a/]
USSR	Training for two fellows and defrayal of the cost of two scientific visitors	5 100
USA	Five experts, equipment for 40 projects in 25 countries and defrayal of the cost of one training course	853 400
TOTAL	Twenty-four experts, one associate expert, equipment for 48 projects in 26 countries, contributions towards meeting the cost of three training courses and three scientific visitors and training for 38 fellows	1 539 200

a/ Includes payments amounting to $26 200 in 1978 in respect of training courses held in previous years.

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

Source of funds	Assistance provided	Expenditure $
Brazil	One expert	39 300
Hungary	Equipment for one project	8 000
Iraq	Training for one fellow	1 800
Pakistan	Equipment for one project	40 000
Uruguay	Equipment for one project	3 500
TOTAL	One expert, equipment for three projects and training for one fellow	92 600

C. Estimated value of the assistance in kind provided through the Agency in 1978

Donor	Assistance provided	Value $
Argentina	Five lecturers, contribution towards meeting the cost of one scientific visitor, training for three Type II fellows (13 man-months) and a contribution towards meeting the cost of a technical excursion for 12 training course participants	29 500
Austria	One lecturer, a contribution towards meeting the cost of one scientific visitor and training for four Type II fellows (11 man-months)	8 900
Bangladesh	One lecturer	700
Belgium	One lecturer and training for five Type II fellows (25 man-months)	18 700
Brazil	Eight lecturers, a contribution towards meeting the cost of two scientific visitors, training for four Type II fellows (12 man-months) and a contribution towards meeting the cost of a technical excursion for 12 training course participants	32 200
Bulgaria	Training for three Type II fellows (9 man-months)	6 300
Canada	Eight lecturers	10 800
Chile	One lecturer	1 200

Donor	Assistance provided	Value $
Czechoslovakia	One lecturer, a contribution towards meeting the cost of three scientific visitors and training for one Type II fellow (3 man-months)	4 500
Denmark	One expert, two lecturers and training for seven Type II fellows (45 man-months)	38 700
Finland	Two lecturers	1 600
France	Nine lecturers and training for 21 Type II fellows (126 man-months)	108 600
German D.R.	One lecturer	500
Germany, F.R.	Thirteen lecturers and training for 17 Type II fellows (83 man-months)	116 900
Greece	One lecturer	3 200
Hungary	One lecturer, a contribution towards meeting the cost of one scientific visitor, training for seven Type II fellows (27 man-months) and a contribution towards meeting the cost of a training course	32 200
Iceland	One lecturer	3 000
India	Four lecturers and training for five Type II fellows (18 man-months)	20 800
Israel	One lecturer and training for three Type II fellows (12 man-months)	9 300
Italy	Two lecturers and training for 29 Type II fellows (131 man-months)	95 500
Japan	Training for two Type II fellows (6 man-months)	7 200
Korea, R.	One lecturer	2 300
Mexico	Three lecturers	3 400
Netherlands	One lecturer and training for five Type II fellows (17 man-months)	12 800
Pakistan	Three lecturers	9 800
Philippines	Two lecturers and training for one Type II fellow (5 man-months)	5 700
Poland	One lecturer and training for six Type II fellows (27 man-months)	29 800
Romania	Training for three Type II fellows (16 man-months)	11 200
Spain	Six lecturers and training for six Type II fellows (32 man-months)	28 000

Donor	Assistance provided	Value $
Sri Lanka	One lecturer	11 100
Turkey	One lecturer	800
United Kingdom	Six lecturers and training for five Type II fellows (41 man-months)	34 500
USA	Six experts, six lecturers, equipment for six projects in six countries and training for 165 Type II fellows (976 man-months)	1 258 100
Venezuela	Contribution towards meeting the cost of a training course	13 100
Yugoslavia	One lecturer and training for two Type II fellows (12 man-months)	9 600
IBRD	One lecturer	2 100
IEA of OECD	Four lecturers	1 000
IIASA	One lecturer	900
UNSCEAR	One lecturer	2 300
TOTAL	Seven experts, 105 lecturers, equipment for six projects in six countries, contributions towards meeting the cost of seven scientific visitors and four training courses, and training for 304 Type II fellows (1647 man-months)	1 986 800

ANNEX III

INTERCOUNTRY PROJECTS: 1978

Project title	Place and dates	Source of funds	Participation[a/] (1)	(2)	(3)
Interregional training course on electric system expansion planning	Argonne, Illinois, USA 14 February to 14 April	Regular programme	16	-	-
Interregional training course on nuclear power plant construction and operation management	Argonne, Illinois, USA 14 February to 25 May	Regular programme	32	-	-
Regional training course on the practical use of radio-isotope techniques in industry for process and quality control	Caracas, Venezuela 27 March to 28 April	Regular programme and the Governments of the Federal Republic of Germany and Venezuela	9	-	9
Interregional training course on calibration methods for radiation measuring devices	Neuherberg, Federal Republic of Germany 3 to 28 April	Regular programme	9	13	-
Interregional training course on the use of isotope and radiation techniques in studies of soil/plant relationships	Seibersdorf, Austria 17 April to 2 June	SIDA	16	-	-
Interregional training course on the use of nitrogen-15 in soil science and plant nutrition studies	Leipzig, German Democratic Republic 3 May to 2 June	Regular programme	19	-	-
Interregional training course on the role of nuclear energy within a national energy plan	Saclay, France 8 May to 7 July	Regular programme	32	2	-
Interregional training course on food irradiation	Casaccia, Italy 9 May to 16 June	Regular programme	14	-	-
Interregional training course on nuclear electronics	Dublin, Ireland 19 June to 8 September	Regular programme	16	-	-
Interregional training course on neutron generators	Debrecen, Hungary 14 August to 1 September	Regular programme and the Government of Hungary	15	-	-
Interregional training course on safety analysis review	Argonne, Illinois, USA 28 August to 20 October	Regular programme	28	1	-
Interregional training course on uranium exploration and evaluation	Golden, Colorado, USA 28 August to 20 October	Regular programme	19	7	-
Study tour on the application of isotope and radiation techniques in medicine	USSR 1 to 19 September	Regular programme	25	-	-

Project title	Place and dates	Source of funds	Participation[a] (1)	(2)	(3)
Interregional training course on the application of nuclear techniques in agriculture	Moscow, USSR 1 September to 30 November	Regular programme	15	-	-
Interregional training course on nuclear power project planning and implementation	Karlsruhe, Federal Republic of Germany 4 September to 24 November	Regular programme	32	-	-
Interregional training course on nuclear power project planning, development and construction	Spain, Argentina, Brazil 13 September to 16 December	Regular programme and the Governments of Argentina and Brazil	24	4	4
Study tour on radiological protection and waste management	France, Federal Republic of Germany, Hungary, Czechoslovakia, German Democratic Republic 18 September to 13 October	Regular programme	22	-	-
Study tour on the application of nuclear methods in agriculture	Ukrainian SSR 6 to 22 October	Regular programme	19	-	-
Seminar on the application of nuclear techniques in agriculture	India 16 to 29 October	UNDP	15	-	5
Interregional training course on quality assurance	Argonne, Illinois, USA 23 October to 22 November	Regular programme	29	5	-
Interregional training course on physical protection of nuclear facilities and materials	Albuquerque, New Mexico, USA 1 to 15 November	Government of the USA	25	-	-
Interregional training course on nuclear manpower development	Karlsruhe, Federal Republic of Germany 27 November to 20 December	Regular programme	19	1	-
Use of radioisotopes in industry[b]	Asia and the Pacific	Regular programme	-	-	-

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

b/ Under this project 22 man-months of expert services were provided for the conduct of a survey.

ANNEX IV

FORMAL REPORTS SUBMITTED TO RECIPIENT COUNTRY GOVERNMENTS[a]

A. Experts' final reports

Reference number	Name of expert	Subject	Country of assignment
1285	Drost, W.	Radioisotopes in hydrology	Bulgaria
1286	Rodrigues, A.G.	Administration of nuclear centres[b]	Argentina
1288	Lanzl, L.H.	Dosimetry	Israel
1289	Joy, A.S.	Uranium ore processing	Mexico
1290	Morante, V.M.	Raw materials prospection	Thailand
1291	Op de Beeck, J.P.	Neutron activation analysis	Portugal
1292	Parkinson, T.P.	Neutron spectrometry	Argentina
1294	Christensen, E.A.	Radiation unit for industrial application of ionizing radiation	Yugoslavia
1295	Tominaga, H.	X-ray fluorescence	Chile
1296	Vachaud, G.	Agricultural applications of radioisotopes[c]	Senegal
1297	Petkar, D.V.	Safety of nuclear power plants	Argentina
1298	Vidmar, M.	Health physics[b]	Peru
1299	Sudarsan, P.	Food preservation	Sri Lanka
1300	Steenberg, K.	Use of radioisotopes in agriculture (soil fertility)	Korea, R.
1301	Lackey, J.A.	Nuclear materials prospection (uranium ore processing)	Philippines
1302	Fernandez Gonzales, J.	Use of radioisotopes in agriculture[b]	Peru
1303	Bullough, R.	Fuel element technology	Argentina
1306	Van der Hoven, I.	Reactor siting	Thailand
1308	Kivi, E.I.	Radioisotopes in agriculture	Iraq
1309	Vandor, F.G.	Radiotherapy physics	Afghanistan
1310	Specter, H.	Nuclear power plant safety	Mexico
1311	Hopkins, L.	Radioisotopes in animal production	Uruguay

Reference number	Name of expert	Subject	Country of assignment
1312	Flakus, F.N.	Radiological safety	Bolivia
1313	Belcher, E.H.	Nuclear medicine in vitro radioassay procedures	Panama
1314	Wright, H.A.	Reactor safety analysis	Turkey
1316	Newton, D.	External counting for alpha emitters	India
1317	Haapanen, P.	Nuclear power training	Turkey
1318	Schultz, N.	Food preservation	Thailand
1320	Rao, K.R.	Neutron scattering	Korea, R.
1321	Sansom, B.F.	Radioisotopes in animal nutrition	Iceland
1322	Chysky, J.	Radiation protection	Ethiopia
1323	El Bassam, N.	Use of isotopes in agriculture	Senegal
1324	Widell, C.O.	Dosimetry	Iran
1328	Wright, H.A.	Safety mission for the Laguna Verde nuclear power plant	Mexico
1329	Paic, G.	Nuclear physics[c/]	Madagascar
1332	Mikolajow, A.T.	Radioisotopes in medicine	Zambia
1333	Krause, H.	Radiation waste management disposal	Iran
1335	Nordlund, G.	Reactor safety analysis	Turkey
1337	Truong Binh	Use of radiotracers for the study of root development of upland rice[c/]	Ivory Coast
1338	Vachaud, G.	Agricultural applications of radioisotopes[c/]	Ivory Coast
1341	Silvennoinen, P.	Linear accelerator engineering	Yugoslavia
1342	Niewiadomski, T.	Radiation protection	Bulgaria
1344	Iansiti, E.	Reactor siting	Argentina
1345	Thiele, R.W.	Radioisotope centre	Libyan A.J.
1346	Horak, O.	Agricultural applications of radioisotopes[c/]	Morocco
1347	Radicella, R.	Radioisotope production	Portugal

Reference number	Name of expert	Subject	Country of assignment
1348	Chen, S.S.	Fuel elements technology structual behaviour	Argentina
1349	Di Chiara, F.	Nuclear medicine[c/]	Morocco
1350	Beirne, T.	Neutron diffraction	Chile
1351	Kaufmann, F.	Reprocessing pilot plant[b/]	Mexico
1353	King, W.	Uranium prospection	Portugal
1355	Das, H.A.	Activation analysis	Saudi Arabia
1356	Fettweis, P.	Nuclear engineering	Egypt
1358	Danfors, E.	Use of radioisotopes in agriculture	U.R. Tanzania
1359	Cairo, A.E.	Applied nuclear sciences[b/]	Guatemala
1360	Sommer, K.	Use of radioisotopes in agriculture	Costa Rica
1361	Rogers, L.R.	Power reactor safety	Mexico
1362	Gonfiantini, R.	Radioisotopes in hydrology	Greece
1363	Alcala, F.	Reactor operation[b/]	Chile
1364	Leitz, Ch.	Embrittlement of reactor pressure vessel steels	Argentina
1365	Fitz, L.	Safety of nuclear power plants	Argentina
1366	Megaw, H.D.	Crystallography	Argentina
1367	Matolin, M.	Gamma-ray spectrometry prospection of nuclear raw materials	Egypt
1368	Gallagher, M.J.	Uranium prospection	Venezuela
1369	Beall, R.A.	Zirconium alloys	Argentina
1370	Nachado, J.H.	Nuclear science training	Peru
1371	Biersack, J.	Simulation by ion implantation	Argentina
1372	Bengtsson, L.B.	Radiation dosimetry	Guatemala
1373	Bhat, I.S.	Radiation safety survey	Thailand
1374	Kreiner, H.J.	Reactor research centre	Malaysia
1375	Boyd, F.C.	Nuclear power plant safety	Korea, R.

Reference number	Name of expert	Subject	Country of assignment
1399	Dahlborg, U.	Research reactor utilization	Yugoslavia
1400	Mikaelsen, K. Mistry, K. Serghiou, C. S.	IAEA programming mission in agriculture	Sri Lanka
1401	Djurdjević, Dj.	Use of radioisotopes in animal science	Malaysia
1402	Wilpolt, R. H.	Uranium contract mission	Zambia
1403	Kristensen, H.	Radiation unit for the industrial application of ionizing radiation	Yugoslavia
1404	Villalva, I.	Nuclear power safety	Mexico
1405	Mikaelsen, K. Mistry, K. Serghiou, C. S.	Advisory mission	Malaysia
1406	Lengemann, F. W.	Use of radioisotopes in agriculture[b/]	Peru
1407	Fernandez Gonzales, J.	Applications of isotopes in agriculture[b/]	Uruguay
1408	Hartog, J. M.	Defective fuel elements	Argentina
1409	Collins, P. J.	Nuclear power plant safety analysis	Brazil
1410	Rojas, J. L.	Fuel elements	Turkey
1412	Premoli, C.	Uranium prospection	Paraguay
1413	Vauclin, M.	Agricultural applications of radioisotopes[c/]	Ivory Coast
1415	Lanzl, L. H.	Secondary standard dosimetry laboratory	Ghana
1416	Rosen, M. Dabek, W.	Nuclear regulations	Egypt
1418	Monnin, M. M.	Reactor utilization and nuclear techniques application	Ghana
1419	Monnin, M. M.	Nuclear physics	Costa Rica
1420	Krause, H.	Radiation waste management disposal	Iran
1421	Beirne, T.	Neutron diffraction	Chile

Reference number	Name of expert	Subject	Country of assignment
1376	Suck, J.B.	Neutron scattering	Korea, R.
1377	Söchting, H.G.	Agricultural applications of radioisotopes[c/]	Senegal
1378	Beaudroit, G.C.	Food irradiation[c/]	Zaire
1379	Ashraf, M.	Mediterranean fruit-fly control	Mexico
1380	Christensen, J.	Cooling system for nuclear power stations	Argentina
1381	Taylor, J.	The uranium potential of Nicuragua	Nicuragua
1382	Kump, P.	Reactor utilization	Ghana
1383	Nagel, E.	Reactor safety	Pakistan
1384	Jennings, F.W.	Use of radioisotopes in animal science	Indonesia
1385	Pecorini, V.	Dynamic/functional studies with radioisotopes[b/]	El Salvador
1386	Ruhlman, W.A.	Quality assurance for NPP	Korea, R.
1387	Colton, J.P.	Irradiation studies using a King furnace	Indonesia
1388	Gopalakrishnan, K.R.	Nuclear electronics	Indonesia
1389	Cairo, A.E.	Centre for Nuclear Studies[b/]	Costa Rica
1390	Ghose, A.M.	Neutron physics	Burma
1391	Svensson, E.O.	Medical physics	Jordan
1392	Karashimada, T.	Food preservation	Thailand
1393	Mikaelsen, K. Mistry, K. Serghiou, C.S.	Advisory mission	Indonesia
1394	Lamm, C. Mikaelsen, K. Serghiou, C.S.	Advisory mission	Pakistan
1395	Czock, K.H.	Neutron activation analysis	Romania
1396	Jovanović, M.	Use of radioisotopes in animal science	Ethiopia
1397	Britton, K.E. Tothill, P.	Isotopes in medicine Nuclear medicine	Bangladesh

Reference number	Name of expert	Subject	Country of assignment
1422	L'Annunziata, M.F.	Nuclear energy planning in agriculture	Nicaragua
1423	Drost, W.	Use of radioisotopes in hydrology	Bangladesh
1424	Bory, P.	Radiological protection[b/]	Bolivia
1425	Flakus, F.N.	Radiation protection	El Salvador
1426	Cameron, J.	Politics of uranium exploration and exploitation policy[b/]	Paraguay

B. Technical reports emanating from UNDP- or SIDA-assisted projects

Recipient country	Project title	Report title	Technical report number
Bangladesh	Development of the Institute of Nuclear Agriculture	(A consultancy report	1
		(Status report of the General (Consultant	2
		(Status report of the General (Consultant	3
Brazil	Application of nuclear technology in agriculture	(Animal parasitology and production	13
		(Soil microbiology	14
		(Plant biochemistry	15
		(Plant biochemistry	16
Chile	Uranium prospection	Exploration methods: Report of a consultancy mission	15
Korea, R.	Radiation processing demonstration facility	(Commissioning report	2
		(Use of project equipment	3
Pakistan	Plant breeding using induced mutations	Rice breeding:	1

C. Terminal reports on projects assisted by UNDP

Recipient country	Project title	Project Manager/ Chief Technical Adviser
Burma	Genetic improvement of crop plants using induced mutations	M. S. Haq

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

b/ Available in Spanish only.

c/ Available in French only.

ANNEX V

VOLUNTARY CONTRIBUTIONS AND COST-FREE FELLOWSHIPS FOR THE 1978 REGULAR PROGRAMME

1. As requested by the Technical Assistance Committee of the Board of Governors, information is given in Table A below in respect of the pledges of voluntary contributions of Member States to the General Fund for 1978.

Table A

Voluntary contributions pledged and paid to the General Fund for 1978 as at 31 December 1978

Member State	1978 Base rate %	Share of $7 million target for voluntary contributions for 1978 using the base rate[a/b/]	Pledged $	Paid $
(1)	(2)	(3)	(4)	(5)
Afghanistan	0.02	1 400	-	-
Albania	0.02	1 400	-	-
Algeria	0.11	7 700	-	-
Argentina	0.89	62 300	66 750	53 400
Australia	1.63	114 100	122 250	122 250
Austria	0.68	47 600	47 600	47 600
Bangladesh	0.04	2 800	-	-
Belgium	1.15	80 500	110 102	110 102
Bolivia	0.02	1 400	-	-
Brazil	1.12	78 400	78 400	78 400
Bulgaria	0.14	9 800	10 000	10 000
Burma	0.02	1 400	-	-
Byelorussian SSR	0.43	30 100	29 070	29 070
Canada	3.18	222 600	222 600	222 600
Chile	0.10	7 000	8 000	8 000
Colombia	0.12	8 400	-	-
Costa Rica	0.02	1 400	-	-
Cuba	0.14	9 800	9 800	-
Cyprus	0.02	1 400	1 400	1 400
Czechoslovakia	0.93	65 100	27 933	27 933
Democratic Kampuchea	0.02	1 400	-	-
Democratic People's Republic of Korea	0.05	3 500	-	-
Denmark	0.68	47 600	47 600	47 600
Dominican Republic	0.02	1 400	-	-
Ecuador	0.02	1 400	1 400	1 400
Egypt	0.09	6 300	7 143	7 143
El Salvador	0.02	1 400	-	-
Ethiopia	0.02	1 400	-	-
Finland	0.44	30 800	33 000	33 000
France	6.07	424 900	120 000	120 000
Gabon	0.02	1 400	-	-
German Democratic Republic	1.45	101 500	111 628	111 628
Germany, Federal Republic of	8.31	581 700	581 700	581 700
Ghana	0.02	1 400	2 609	-
Greece	0.42	29 400	29 400	16 583

Member State (1)	1978 Base rate % (2)	Share of $7 million target for voluntary contributions for 1978 using the base rate[a/][b/] (3)	Pledged $ (4)	Paid $ (5)
Guatemala	0.02	1 400	150	150
Haiti	0.02	1 400	-	-
Holy See	0.02	1 400	-	-
Hungary	0.36	25 200	51 335	51 335
Iceland	0.02	1 400	-	-
India	0.75	52 500	60 000	60 000
Indonesia	0.15	10 500	10 500	10 500
Iran	0.46	32 200	35 000	35 000
Iraq	0.11	7 700	7 700	7 700
Ireland	0.16	11 200	11 200	11 200
Israel	0.26	18 200	18 200	18 200
Italy	3.54	247 800	-	-
Ivory Coast	0.02	1 400	-	-
Jamaica	0.02	1 400	-	-
Japan	9.30	651 000	651 000	651 000
Jordan	0.02	1 400	-	-
Kenya	0.02	1 400	-	-
Korea, Republic of	0.14	9 800	9 800	9 800
Kuwait	0.17	11 900	11 900	11 900
Lebanon	0.03	2 100	-	-
Liberia	0.02	1 400	-	-
Libyan Arab Jamahiriya	0.18	12 600	50 000	-
Liechtenstein	0.02	1 400	1 400	1 400
Luxembourg	0.04	2 800	-	-
Madagascar	0.02	1 400	-	-
Malaysia	0.10	7 000	7 000	7 000
Mali	0.02	1 400	-	-
Mauritius	0.02	1 400	-	-
Mexico	0.84	58 800	58 800	58 800
Monaco	0.02	1 400	-	-
Mongolia	0.02	1 400	1 400	1 400
Morocco	0.05	3 500	3 500	3 500
Netherlands	1.48	103 600	111 000	111 000
New Zealand	0.30	21 000	-	-
Nicaragua	0.02	1 400	-	-
Niger	0.02	1 400	-	-
Nigeria	0.14	9 800	-	-
Norway	0.46	32 200	32 200	32 200
Pakistan	0.06	4 200	4 500	4 500
Panama	0.02	1 400	1 400	-
Paraguay	0.02	1 400	-	-
Peru	0.06	4 200	-	-
Philippines	0.11	7 700	11 500	11 500
Poland	1.50	105 000	75 301	75 301
Portugal	0.21	14 700	15 000	15 000
Qatar	0.02	1 400	1 400	-
Romania	0.28	19 600	21 000	2 100
Saudi Arabia	0.26	18 200	70 000	70 000
Senegal	0.02	1 400	-	-
Sierra Leone	0.02	1 400	-	-
Singapore	0.09	6 300	1 800	1 800
South Africa	0.43	30 100	30 100	30 100
Spain	1.64	114 800	30 000	23 500
Sri Lanka	0.02	1 400	-	-
Sudan	0.02	1 400	2 500	-
Sweden	1.29	90 300	90 300	90 300
Switzerland	1.03	72 100	72 100	72 100
Syrian Arab Republic	0.02	1 400	-	-
Thailand	0.11	7 700	7 700	7 700
Tunisia	0.02	1 400	-	-

Member State	1978 Base rate %	Share of $7 million target for voluntary contributions for 1978 using the base rate[a/][b/]	Pledged $	Paid $
(1)	(2)	(3)	(4)	(5)
Turkey	0.32	22 400	22 400	22 400
Uganda	0.02	1 400	-	-
Ukrainian Soviet Socialist Republic	1.61	112 700	115 108	115 108
Union of Soviet Socialist Republics	12.16	851 200	920 680	920 680
United Arab Emirates	0.09	6 300	6 300	6 300
United Kingdom of Great Britain and Northern Ireland	4.77	333 900	333 900	333 900
United Republic of Cameroon	0.02	1 400	-	-
United Republic of Tanzania	0.02	1 400	-	-
United States of America	25.00	1 750 000	1 750 000	1 750 000
Uruguay	0.04	2 800	2 800	2 800
Venezuela	0.43	30 100	30 100	30 100
Viet Nam	0.03	2 100	-	-
Yugoslavia	0.41	28 700	28 700	28 700
Zaire	0.02	1 400	-	-
Zambia	0.02	1 400	1 400	1 400
TOTAL	100.00	7 000 000	6 446 459	6 327 183

a/ As recommended in General Conference Resolutions GC(V)/RES/100 and GC(XV)/RES/286.

b/ The Board of Governors, in recommending a target of $7 million, made a special appeal to Member States for additional voluntary contributions in the amount of $500 000. The General Conference endorsed the Board's special appeal, GC(XXI)/RES/348.

2. The man-months of Type II fellowships provided through the Agency in 1978 are shown in Annex II. C. As numerous fellows do not take up their training in the given programme year some of the awards reflected in the statistics in Annex II. C will have been made prior to 1978.

3. A list of fellowships made available to the Agency cost free for 1978 is given in Table B on page 85; some of the Type II fellowships awarded were carried over from a previous year. (Table B does not include the man-months represented by Type II fellowship extensions of less than six months each that were approved in 1978 in respect of awards originally made under the fellowship programme for 1977 or a previous year.)

Table B

Fellowships offered or provided cost free

Donor	Number of fellowships			
	Available		Awarded	
	(1)	(2)	(3)	(4)
I. Member States				
Argentina	5	60	3	20
Austria	-	17	3	15
Belgium	6	36	3	30
Brazil	10	120	5	43
Bulgaria	2	12	2	12
Czechoslovakia	9	-	1	12
Denmark	5	60	3	30
France	-	140	9	93
Germany, Federal Republic of	25	125	9	89
Hungary	4	-	7	27
India	5	-	3	27
Israel	-	45	2	24
Italy	25	200	8	78
Japan	10	90	6	46
Mexico	2	-	1	3
Netherlands	8	-	4	24
Pakistan	6	-	-	-
Philippines	3	-	-	-
Poland	10	-	5	44
Romania	10	100	2	20
Spain	5	60	4	33
Thailand	2	-	-	-
United Kingdom	4	-	1	18
United States of America	a/	-	81	721
Yugoslavia	-	22	2	18
II. Regional organizations				
JINR/Dubna	3	36	-	-

(1) Number of awards offered

(2) Number of man-months offered.

(3) Number of awards less rejections and withdrawals.

(4) Total number of man-months awarded.

a/ Awards made on the basis of available funds.

ANNEX VI

PROJECTS UNDER IMPLEMENTATION FOR UNDP

(in thousands of dollars)

Project code number and title		Amount approved	Approved budgets				
			Prior to 1978	1978[a/]	1979	1980	1981
Albania							
ALB/72/002	Assistance to the Institute of Nuclear Physics, Tirana	60	53	7			
ALB/74/002	Gamma encephalographic laboratory	96	51	45			
Argentina							
ARG/71/537	National Centre for Non-destructive Testing and Quality Control	948	449	426	73		
Bangladesh							
BGD/77/008	Exploration for uranium and thorium	67	7	50	10		
Brazil							
BRA/71/556	Application of nuclear technology in agriculture	1346	1197	149			
BRA/76/003	Nuclear manpower qualification and training	2182	59	677	775	617	54
Bulgaria							
BUL/77/013	Development of a centre for the application of isotopes	450	-	59	171	119	101
Chile							
CHI/71/545	National Nuclear Energy Centre, Santiago	815	804	11			
CHI/74/005	Uranium prospection	1154	745	275	134		
CHI/76/008	Nuclear power plant	1445	44	591	558	252	
Colombia							
COL/76/031	Prospection of radioactive minerals	760	-	113	500	147	
Cuba							
CUB/77/001	Introduction of nuclear techniques into the national economy	22	16	6			
Egypt							
EGY/73/037	National Centre for Radiation Technology	637	498	121	18		
Ethiopia							
ETH/78/005	Application of nuclear techniques	58	-	45	13		
Ghana							
GHA/74/004	Training in the use of nuclear techniques	75	44	24	7		
Greece							
GRE/73/006	Exploration for uranium in Central and Eastern Macedonia and Thrace	644	642	2			

Project code number and title		Amount approved	Approved budgets				
			Prior to 1978	1978[a/]	1979	1980	1981
Hungary							
HUN/71/509	Use of ionizing radiation for the sterilization of medical supplies	503	475	28			
India							
IND/75/035	Geochemical investigations for uranium, thorium and associated atomic minerals	293	-	293			
Indonesia							
INS/68/043	Application of radioisotopes in agriculture - mutation breeding	136	131	5			
Kenya							
KEN/78/005	Advisory services on uranium legislation	8	-	8			
Morocco							
MOR/73/019	Training and research in applied nuclear physics at the Faculty of Sciences, Rabat	679	465	161	53		
Nigeria							
NIR/72/005	Use of nuclear techniques in animal production	544	24	151	243	126	
NIR/72/044	Insecticidal investigation for tsetse fly eradication	259	122	70	58	9	
Pakistan							
PAK/72/014	Plant breeding using induced mutations	108	97	11			
PAK/74/002	Exploration for uranium in the Siwalik Sandstones	843	743	100			
Peru							
PER/76/002	Nuclear energy	1900	189	310	585	512	304
Philippines							
PHI/75/003	Training and consultancy in nuclear power plant safety analysis, engineering and public information	162	10	51	101		
Romania							
ROM/72/001	Development of nuclear technology	1435	1340	95			
ROM/76/023	Development of nuclear technology (Phase II)	640	-	247	353	40	
Sri Lanka							
SRL/72/045	Radiobiology Unit, Faculty of Medicine, Peradeniya	15	12	3			
SRL/77/014	Radioactive tracer techniques for the study of coastal sedimentology	143	-	86	57		
Sudan							
SUD/74/018	Use of isotopes in studies on adaptation nutrition and the health of domestic animals	87	85	2			

Project code number and title		Amount approved	Approved budgets				
			Prior to 1978	1978[a/]	1979	1980	1981
Syrian Arab Republic							
SYR/72/018	Use of isotopes in agriculture - efficiency in water and fertilizer use	89	76	13			
SYR/72/019	Use of radioisotopes in animal science	59	17	42			
Turkey							
TUR/72/036	Exploration for uranium in South West Anatolia	819	767	31	21		
TUR/74/053	Utilization of isotopes in hydrology	107	91	6	10		
Yugoslavia							
YUG/73/001	Nuclear research and training in agriculture	136	135	1			
YUG/74/025	Radiation unit for the industrial application of ionizing radiation	433	334	99			
Asia and the Pacific							
RAS/75/035	Regional training course on the technical and economic aspects of nuclear power with emphasis on manpower development	43	42	1			
RAS/75/037	Seminar on the application of nuclear techniques in agriculture	30	-	30			

a/ The carry-over of the unimplemented provisions into 1979 and future years has been requested.

ANNEX VII

REGULAR PROGRAMME PROJECTS COMPLETED OR CANCELLED DURING 1978

A. Completed projects

Member State	Project title and code	Year of approval	Assistance provided	
			Experts (man-months)	Equipment ($)
Afghanistan	Radiotherapy physics, AFG/6F/08	1977, 1978	13	21 000
Argentina	Nuclear power plant management, ARG/0G/04	1974	2	-
	Cooling systems, ARG/4D/55	1976	2	-
	Safety of nuclear power plants, ARG/9D/05	1976	2	-
Bangladesh	Radiation dosimetry, BGD/9C/02	1977	-	20 000
	Radiosterilization of medical products, BGD/7E/02	1978	-	4 000
	Environmental protection, BGD/9G/03	1978	-	17 000
Bolivia	Isotopes in agriculture, BOL/5B/03	1976	1	-
	Radioimmunoassay, BOL/6B/08	1976	2	19 000
	Uranium prospection, BOL/3B/06	1977	6	48 000
	Radiological safety, BOL/9C/03	1977	4	8 000
Brazil	Nuclear power plant safety, BRA/9D/08	1975	6	-
	Radioisotopes in hydrology, BRA/8N/18	1977	2	-
	Total and soluble uranium in granite rocks, BRA/3C/06	1978	-	41 000
Bulgaria	Isotopes in hydraulic engineering, BUL/8D/05	1975	1	22 000
	Radiation protection, BUL/9C/03	1976	2	25 000
	Neutron activation analysis, BUL/2C/05	1976	1	30 000
Chile	Radioisotopes in agriculture, CHI/5B/08	1977	-	13 000
Colombia	Isotopes in agriculture, COL/5B/04	1975	7	21 000
Costa Rica	Radioimmunoassay, COS/6B/05	1975	3	26 000

Member State	Project title and code	Year of approval	Assistance provided	
			Experts (man-months)	Equipment ($)
Costa Rica	Isotopes in agriculture, COS/5B/03	1975	12	19 000
	Nuclear Research Centre, COS/0H/02	1977	1	-
Cuba	Labelled compounds, CUB/2F/03	1977	-	25 000
Cyprus	Isotopes in agriculture, CYP/5B/10	1976	-	15 000
Ecuador	Nuclear medicine, ECU/6B/05	1977	-	14 000
	Radioisotopes in agriculture, ECU/5A/03	1978	1	8 000
Egypt	Materials testing, EGY/4E/11	1973	-	49 000
	Neutron physics, EGY/1E/09	1973, 1977	6	47 000
	Raw materials prospection, EGY/3B/09	1974, 1977, 1978	4	49 000
	Nuclear regulations, EGY/9B/09	1978	1	-
El Salvador	Nuclear medicine, ELS/6B/06	1976	2	13 000
Ethiopia	Isotopes in animal science, ETH/5F/03	1975, 1977, 1978	28	23 000
Ghana	Nuclear Centre, GHA/0H/03	1977	-	41 000
	Solid state physics, GHA/1G/06	1977	-	23 000
	Secondary standards dosimetry laboratory planning, GHA/9C/03	1978	1	-
Greece	Nuclear physics, GRE/1D/30	1975	2	-
	Isotope hydrology, GRE/8D/04	1975	3	25 000
	Computer programming/spectroscopy, GRE/9G/07	1976	2	-
	Radiopharmaceuticals, GRE/2G/11	1978	-	16 000
Guatemala	Radiation dosimetry, GUA/1K/02	1975	4	9 000
Hungary	Food irradiation, HUN/5H/10	1976	-	116 000
	Radiation protection, HUN/9C/04	1977	-	31 000
	Environmental monitoring, HUN/9F/05	1977	-	32 000
Iceland	Radioactive logging, ICE/8O/02	1976	1	65 000
India	Nuclear power training, IND/4C/07	1976	-	50 000
	Pesticide residues, IND/5G/09	1977	-	33 000
India	X-ray fluorescence, IND/2C/04	1978	-	25 000
	Computer memory, IND/4G/09	1978	-	16 000

Member State	Project title and code	Year of approval	Assistance provided	
			Experts (man-months)	Equipment ($)
Indonesia	Isotopes in animal science, INS/5E/11	1975	6	10 000
	Radiation measurement instrumentation, INS/4G/11	1976	12	30 000
	Geochemical prospection for nuclear raw materials, INS/3B/04	1977, 1978	12	29 000
Iraq	Isotopes in agriculture, IRQ/5C/05	1976	3	-
Israel	Radiopharmaceuticals, ISR/2G/10	1977	-	15 000
	Metallurgy, ISR/4E/07	1977	-	16 000
Ivory Coast	Isotopes in agriculture, IVC/5B/05	1976	4	20 000
Jordan	Medical physics, JOR/6F/06	1976-1978	39	9 000
Korea, R.	Quality assurance for nuclear power plants, ROK/9D/07	1975	3	-
	Neutron scattering, ROK/1E/05	1976	6	5 000
	Nuclear power plant start-up, ROK/4C/07	1977	9	-
Libyan A.J.	Radioisotope Centre, LIB/0H/03	1976	14	23 000
Madagascar	Nuclear physics, MAG/1D/02	1977	3	35 000
Malaysia	Isotopes in agriculture, MAL/5B/01	1975	4	5 000
	Isotopes in animal science, MAL/5E/04	1977	2	-
Mali	Overall programming, MLI/0B/02	1978	1	-
Mexico	Reprocessing pilot plant, MEX/4J/29	1976	17	-
	Nuclear power safety, MEX/9D/16	1976	12	-
Morocco	Nuclear medicine, MOR/6B/06	1976	3	30 000
Nicaragua	Uranium prospection, NIC/3B/02	1977	3	-
Niger	Radioisotopes in agriculture, NER/5B/02	1978	9	-
Pakistan	Nuclear electronics, PAK/4G/16	1977	-	15 000
Pakistan	Radioisotopes in plant physiology, PAK/5A/11	1978	-	35 000
	Radiation in agriculture, PAK/5A/12	1978	1	-
Panama	Radiochemistry, PAN/2B/02	1972	13	7 000

Member State	Project title and code	Year of approval	Assistance provided	
			Experts (man-months)	Equipment ($)
Paraguay	Radioimmunoassay, PAR/6B/02	1977	1	14 000
Peru	Uranium ore processing, PER/3F/07	1976	4	-
Philippines	Nuclear materials prospection, PHI/3B/02	1974	8	31 000
	Isotopes in hydrology, PHI/8D/07	1975	-	23 000
	Sterilization of medical products, PHI/8I/08	1977	-	25 000
	Radioisotope production, PHI/4H/12	1977	-	33 000
	Uranium geochemical prospection, PHI/3B/04	1977	12	31 000
Portugal	Neutron activation analysis, POR/2C/04	1977	1	24 000
	Radioisotope production, POR/4H/08	1977	2	-
Romania	Non-destructive testing, ROM/8C/03	1974	-	125 000
	Neutron activation analysis, ROM/2C/05	1977	2	52 000
	Radiopharmaceuticals, ROM/2G/06	1977	-	44 000
Saudi Arabia	Activation analysis, SAU/2C/02	1976	1	-
Senegal	Chemical residues, SEN/5G/12	1977	-	15 000
Singapore	Radiation protection instrumentation, SIN/9C/08	1978	-	20 000
Spain	Waste management, SPA/9E/03	1977	12	-
Sri Lanka	Isotopes in hydrology, SRL/8D/04	1975	7	39 000
	Environmental radioactivity, SRL/9C/05	1977	3	14 000
Sudan	Isotopes in hydrology, SUD/8M/02	1976	0.5	6 000
	Radioisotope technician training, SUD/0I/03	1978	-	20 000
	Nuclear medicine, SUD/6A/07	1978	0.5	-
Thailand	Food preservation, THA/5H/17	1975	6	20 000
Turkey	Bid specification/evaluation, TUR/4C/13	1976	4	-
U.R. Tanzania	Overall programming, URT/0B/03	1978	1	-

Member State	Project title and code	Year of approval	Assistance provided	
			Experts (man-months)	Equipment ($)
Uruguay	Nuclear electronics, URU/4G/06	1976	-	21 000
	Isotopes in agriculture, URU/5B/08	1977	1	17 000
	Nuclear veterinary medicine, URU/5F/09	1977	1	-
Yugoslavia	Linear accelerator engineering, YUG/1I/03	1975	4	-
	Radiation protection, YUG/9C/08	1977	-	19 000
	Radiopharmaceuticals, YUG/2G/08	1978	-	19 000
Zambia	Radioisotopes in agriculture, ZAM/5A/03	1978	1	-

B. Cancelled projects

Member State	Project title and code	Year of approval	Assistance approved	
			Experts (man-months)	Equipment ($)
Argentina	Economics of the fuel cycle, ARG/0E/05	1975	7	-
Iraq	Nuclear physics, IRQ/1D/08	1977	12	-
Mexico	Reprocessing pilot plant, MEX/4J/29	1978	7	-
Philippines	Ore beneficiation, PHI/3F/05	1978	6	-
	Isotopes in hydrology, PHI/8D/07	1975	3	-
Uruguay	Food irradiation, URU/5H/07	1976	2	7 000