THE PROVISION OF TECHNICAL ASSISTANCE BY THE AGENCY WITH SPECIAL REFERENCE TO 1971

Report by the Director General

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INTERNATIONAL ATOMIC ENERGY AGENCY

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List of abbreviations

Agency	International Atomic Energy Agency
CERN	European Organization for Nuclear Research
ECOSOC	Economic and Social Council of the United Nations
EPTA	United Nations Expanded Programme of Technical Assistance (now the Technical Assistance component of the United Nations Development Programme)
FAO	Food and Agriculture Organization of the United Nations
IAEA	International Atomic Energy Agency
ILO	International Labour Organisation
Monaco Laboratory	International Laboratory of Marine Radioactivity at Monaco
NPY	Co-operative Programme for Research in Reactor Physics between the Governments of Norway, Poland and Yugoslavia
SIDA	Swedish International Development Authority
Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
UNDP(SF)	United Nations Development Programme (Special Fund component)
UNDP(TA)	United Nations Development Programme (Technical Assistance component)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNSF	United Nations Special Fund
WHO	World Health Organization

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

NOTES

All sums of money are expressed in United States dollars.

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

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

Part I. INTRODUCTION

1. Following its usual practice, the Board of Governors has requested the communication to the General Conference of the material it used in reviewing the provision of technical assistance by the Agency, with special reference to 1971; this material is accordingly reproduced in the present document. The review was carried out pursuant to paragraph 20 of the Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency. [1]

2. The use of the resources placed at the Agency's disposal, in the form of voluntary contributions, gifts in kind, UNDP(SF) and UNDP(TA) funds, for the provision of technical assistance is reviewed in this document; data on UNDP(SF) assistance in respect of projects for which the IAEA was the executing agent have been incorporated in the statistical tables and Figs 1-6 for the first time. This has been done to establish a broader basis for comparison of the data that will be included in the report to be submitted one year hence, in which special reference will be made to the technical assistance provided by the Agency in 1972, which will reflect the full integration of the Special Fund and Technical Assistance components of UNDP. In addition, information is given with regard to the UNDP(SF) projects for which the Agency served as sub-contractor in 1971 in Annex III.

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

4. In 1971, 73 countries received technical assistance in one form or another from the Agency, as shown in Fig. 4B and Table 7 [2]. Approximately two thirds of all assistance provided related to the application of isotopes and radiation in agriculture, nuclear engineering and technology, nuclear physics and the subjects covered by the classification heading "Prospecting, mining and processing of nuclear materials".

5. The assistance, including assistance in kind, was provided through the services of 345 experts, lecturers and visiting professors, the supply of equipment to a value of about $1 489 000, and 739 fellowship awards for individual study, scientific visits, two study tours and other short-term training projects.

6. The resources allocated for carrying out the Agency's 1971 technical assistance programme amounted to $5 630 000 (Table 1), whereas the total value of the technical assistance actually provided in 1971 was about $4 895 000 (Tables 4 and 7). This includes payments against 1971 and prior years' obligations, as well as assistance in kind, and represents an increase of $900 000 or 23% over the sum of $3 486 000 provided in 1970 (Table 4), but does not include the unliquidated obligations and assistance in kind outstanding at the end of the year.

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

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

7. As in earlier reports on the provision of technical assistance by the Agency [3], details are given below regarding activities in which developing countries have shown special interest in 1971, followed by information concerning other developments relating to technical assistance.

A. Technical co-operation activities in which Governments have shown special interest

8. In 1971 more assistance was provided in the application of isotopes and radiation in agriculture than in any other field of activity. With regard to agricultural activities, the largest share of expenditure was devoted to providing assistance in a wide range of nuclear applications covering animal as well as soil sciences as in the case of the large-scale project in India, followed by projects relating to soil chemistry and physics, soil fertility and plant physiology, sterile insect release projects, food preservation projects, and plant breeding and genetics projects, in that order. Except for the large-scale project in India, in respect of which more than half of the expenditure was for equipment in 1971, most of the assistance provided for agricultural projects in that year consisted of the provision of expert services.

9. In terms of the amount of assistance provided, agricultural projects were followed in 1971 by nuclear engineering and technology projects; for the fourth consecutive year, the projects which received most assistance related to nuclear instrumentation and electronics and included the maintenance and repair of nuclear electronic equipment. The growing dependence on properly functioning equipment is recognized by the recipient countries, as evidenced in their requests for expert advice and essential training at the technician level. There was less interest in projects dealing with nuclear power, reactor metallurgy and the production of isotopes.

10. With regard to nuclear physics activities, most assistance was provided in 1971 for nuclear spectroscopy and theoretical physics projects, followed by a wide range of projects relating to radiometry and dosimetry.

11. Although agriculture was the field of activity which ranked first in terms of assistance provided in 1971, the sub-field of activity for which most assistance was provided was prospecting for nuclear raw materials. This was partly due to the scale of the exploration projects currently being carried out by a team of experts in Greece and Pakistan and partly to the prospection projects assisted by the Agency in six additional countries in 1971. Somewhat more than half of the expenditure was for equipment, and most of the balance was used to train counterpart staff in their own countries.

12. The interest shown in the medical applications of isotopes and radiation continues to be devoted primarily to diagnostic and clinical research projects, followed by medical and hospital physics projects. Substantial interest was also shown in projects relating to radiation protection, industrial applications of isotopes and radiation, nuclear chemistry, and isotope hydrology, in that order.

B. Other developments

13. In last year's report reference was made to the new procedures for programming UNDP assistance to developing countries.[4] These procedures were introduced during 1971 in respect of assistance to be provided during 1972-1976. In accordance with certain guidelines for the formulation of a UNDP country programme, the UNDP Resident Representative prepares a background paper reflecting the Government's view of the country's

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[3] See, for example, document GC(XV)/INF/131.

[4] Ibid., para. 13.

development situation and its assessment of the country's overall technical assistance and pre-investment needs. The background paper also includes, where appropriate, conclusions and recommendations resulting from economic surveys, sectoral and inter-sectoral studies and the like which have been made in recent years. This document, prepared in collaboration with the Government and with the United Nations organizations participating in the programme, is then submitted for consideration at a series of meetings of Government representatives and, when so requested, representatives of the United Nations, the specialized agencies and the IAEA. The Government then prepares the first draft of its request for UNDP assistance in its development plan, usually for the period 1972-76. The agencies are asked to comment on this first draft; these comments are then considered by the Government in collaboration with the UNDP Resident Representative, and the final draft "country programme" is forwarded to New York for consideration by the UNDP Secretariat and eventual submission to the Governing Council of UNDP. The final document is normally drawn up in broad terms and in general, larger-scale projects involving sectoral and inter-sectoral assistance, but not small-scale projects, are described in detail. The Governing Council is requested to approve the proposed country programme and to authorize the Administrator of UNDP to proceed with the appraisal and approval of requests for assistance falling within the framework of the country programme and calling for expenditures within the limits of the approved indicative planning figure and the financial resources available at any given time.

14. The whole operation is called "the country programming exercise", and the programme approved by the Governing Council is subject to annual review by the UNDP Resident Representative and the Government.

15. The first group of country programmes, 19 in number, was submitted to the session of the Governing Council held in January 1972. The Agency provided material for consideration in the preparation of the background paper for 16 countries, participated in one series of meetings, and provided substantive comments in respect of the drafts of 13 of the country programme documents. The extent of agency participation varied from that of larger agencies with an established field staff, including mission chiefs and country representatives who participated in most meetings, to that of the smaller agencies, such as the IAEA, which, for example, in view of the limited possibilities for the utilization of nuclear technology in the development of a particular country, would not necessarily be required to attend meetings. The role of the smaller agencies in the exercise is dealt with in the guidelines referred to above, in which it is stated that:

> "The Resident Representative will have a special responsibility to keep in mind the usually highly specialized fields of activity in which the small organizations of the United Nations system have competence and in which they entrust their normal representation to him. Without implying any conception of sectoral 'shares' in UNDP assistance to the country, the Administrator nevertheless expects the Resident Representative to maintain with the help of the organizations concerned, adequate understanding of the relevance of these fields of activity to economic and social development in general and that of the country in particular and of the kinds of international assistance available."

16. There has been adverse comment by the participating agencies and UNDP on this first series of country programme exercises to the effect that insufficient time was available to all concerned - Governments, agencies and UNDP - for carrying out the exercise. This affected in particular the preparation of adequate background papers incorporating the briefs expected from the agencies and the essential on-the-spot review of ongoing UNDP-assisted projects. Several agencies have had to adjust their organizational structure at headquarters to meet the new requirements of UNDP programming by the creation, for example, of a centralized co-ordinating machinery (this already exists in the IAEA). Only limited consultation with Government authorities had been possible, and clarification was needed, in many cases, of the Resident Representative's

role, which has been strengthened under the new procedures; in only a few cases were representatives from the agencies' headquarters requested to attend the discussions with Governments. As a result, further consideration is required as to how the participation of the agencies in the country programme process may be most effective. The matter is still under review by the Governing Council.

17. Requests for UNDP assistance naturally reflect the gap which the Government cannot fill from its own resources in implementing its proposed development plan. Requests therefore vary widely; for example, emphasis is placed in many countries with agricultural economies on the need for:

(a) Labour-intensive projects;

(b) The reorientation of education towards vocational training as a prerequisite for employment, involving the restructuring of educational curricula;

(c) The redirecting of agricultural research towards production; and

(d) Industrialization to reduce the need for imports.

In the more advanced developing countries, the creation of an infrastructure and the building of institutions have been prominent development objectives. The projects which are the subjects of the requests for Agency assistance included in the first group of 19 country programme documents range from large-scale projects involving the use of nuclear technology in power production, in metallurgy and in high dose irradiation facilities, the creation of nuclear centres and the sterilization of pharmaceutical products, to smaller projects involving, for example the use of radioisotopes in resource surveys to provide water for villages being established as co-operative communities in rural areas in Africa.

18. In last year's report reference was also made to the changes in the procedure for developing UNDP-financed regional projects. [5] These will be put into effect as from 1973 rather than 1972 since almost no funds are available for new projects in 1972 owing to the continuing commitments, particularly in respect of long-term projects being executed by the larger agencies. This has adversely affected the Agency's programme of regional and interregional training courses financed by UNDP. In previous years, when the participating agencies received a fixed percentage of funds for these projects, the Agency could plan in the expectation that UNDP funds would be available for eight to ten training courses each year. For 1972, the Agency expects to receive funds for only one such training course. In respect of the new procedure governing UNDP financing of regional projects proposed for implementation during 1973-1977, the Agency took steps in 1971 to advise atomic energy commissions or the appropriate government authorities of the need to ensure that they supported proposals for regional and interregional projects involving the use of nuclear techniques which were considered beneficial to the country.

19. In an endeavour to keep administrative costs to the minimum despite the steadily increasing field programme, internal procedures within the Department of Technical Assistance and Publications were streamlined in several instances and, where practicable, simplified. In 1970, 197 country programme experts had to be recruited; by 1971 this number had risen to 260, and a special registry has now been established which shows at all times posts for which recruitment is proceeding and the precise status of recruitment for each individual post. The previous bi-monthly recruitment status report, circulated to all recruitment sources, has been simplified and is now issued monthly. Additional

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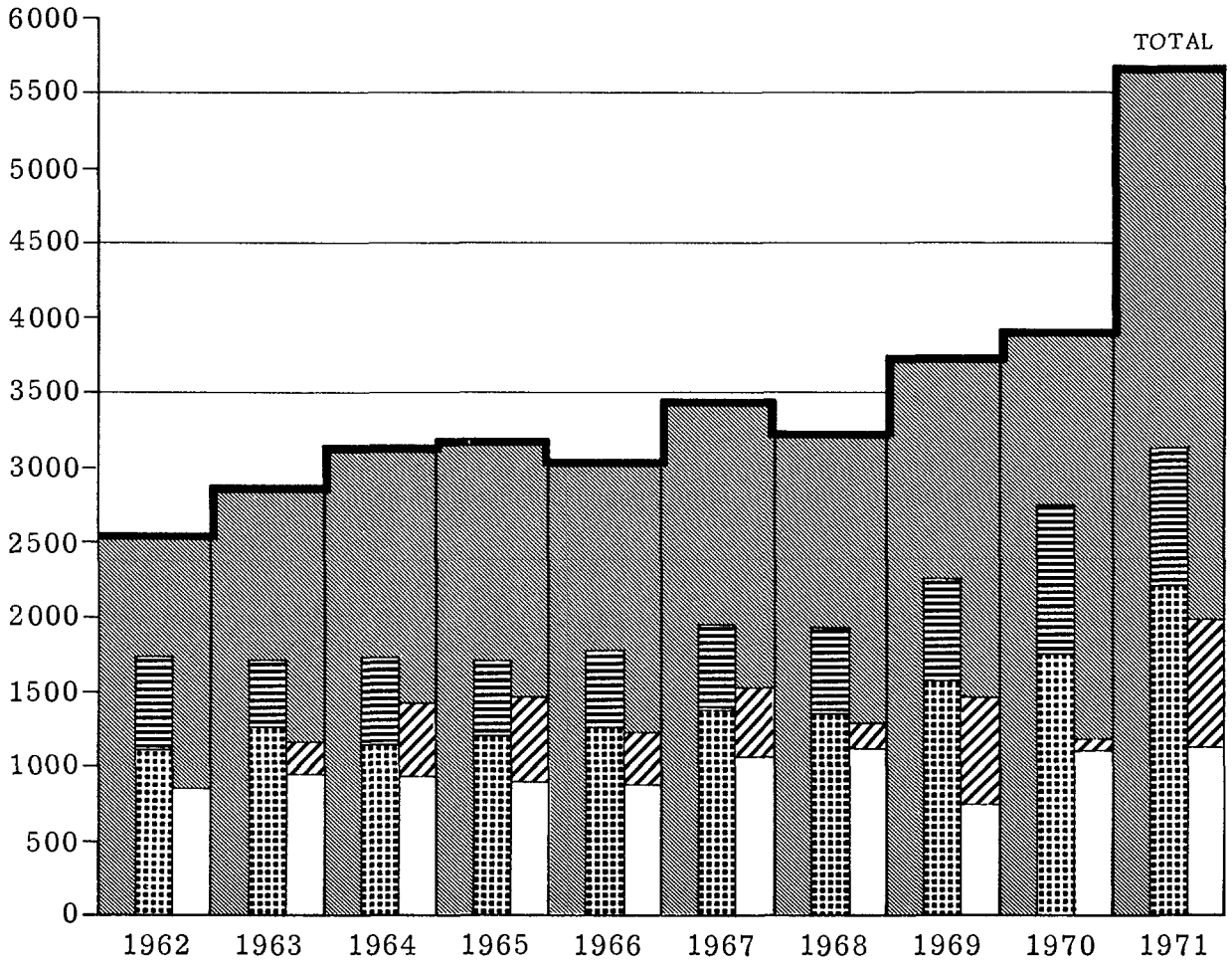
[5] Ibid., para. 14.

standard letters have been introduced to meet recurring routine requirements, and the work load of the experts' recruitment section has been rationalized. In another section essential operations, such as the processing of statistical information on the assistance provided and of the current operational programme and the preparation of detailed financial tables, have been computerized. In the equipment section, the system of handling purchase orders and the documentation concerning the transfer of title to equipment have been recently revised to reduce processing time.

FIGURE 1

RESOURCES AVAILABLE FOR
AGENCY TECHNICAL ASSISTANCE PROGRAMMES: 1962-1971
(in thousands of dollars)



	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Agency monetary	1146	1230	1115	1200	1263	1380	1348	1587	1749	2214
Assistance in kind	588	484	619	511	520	567	578	654	993	1423
EPTA and UNDP(TA)	828	954	946	901	893	1076	1134	735	1127	1132
UNSF and UNDP(SF)	-	207	469	582	348	438	159	749	38	861
TOTAL	2562	2875	3149	3194	3024	3461	3219	3725	3907	5630

Agency monetary

Assistance in kind

EPTA and UNDP(TA)

UNSF and UNDP(SF)

Part II. ANALYSIS OF THE ASSISTANCE PROVIDED

A. Available resources

1. General

20. The resources available to the Agency in 1971 for the provision of technical assistance came to $5 630 000 (see Fig. 1 and Table 1), which is 44% higher than the figure for 1970 ($3 907 000) and is made up as follows:

(a) UNDP, $1 993 000 in cash: $861 000 under the Special Fund component and $1 132 000 under the Technical Assistance component;

(b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, $2 214 000; and

(c) Gifts in kind (services of cost-free and partly cost-free experts, Type II fellowships, training course stipends and grants of equipment in support of approved technical assistance projects) valued at $1 423 000. Of this total, $1 381 000 was made available in respect of the regular programme and $42 000 for UNDP projects.

2. UNDP

21. The funds allocated for carrying out the 1971 UNDP field programme included $293 000 for regional and interregional projects and $1 700 000 for country programme projects; the funds for UNDP(SF) large-scale projects are included in the latter amount.

3. Agency's regular programme

22. As at 31 December 1971, the pledges of voluntary contributions to the General Fund for 1971 had exceeded 85% (the highest percentage attained to date) of the target figure of $2.5 million, as compared with about 84% of the $2 million target figure in respect of 1970. Of the target figure in 1971, 97% was budgeted for technical assistance (94% in 1970). The payment by Member States of current and prior years' pledges was reflected in the income to Operating Fund II ($2 214 000, as compared with $1 749 000 in 1970), from which the regular programme is financed.

4. Gifts in kind

23. The estimated value of assistance in kind made available in 1971 was $1 423 000, which is 43% higher than the figure of about $993 000 for 1970. This rise is attributable to substantial increases in the value of cost-free expert services (from $60 500 to $83 100), equipment grants (from $289 800 to $329 900) and fellowships (from $643 100 to $1 010 000 consisting of Type II fellowship and training course stipends). It is to be noted that about $1.1 million or 75% of the total for assistance in kind made available in 1971 was contributed by three Member States and that the donations in kind expected from States in 1972 will probably not reach $700 000, primarily because of a change in their national budgetary policies.

5. Funds-in-trust

24. No assistance was provided by the Agency under funds-in-trust arrangements in 1971.

6. Use of resources

25. The Agency provided more technical assistance in 1971 than in any previous year. The total value of the assistance, $4 895 500, represents an increase of $910 000 or about 23% over 1970. The individual sums making up the 1971 total are $2 124 300 under the regular programme, $726 100 under UNDP(SF), $1 112 700 under UNDP(TA) and $932 400 in assistance in kind; the regular programme and the assistance in kind totals are the highest on record for a single year. In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1971 amounted to $3 143 100, consisting of $484 600 for expert services, $1 220 400 for equipment and supplies and $1 438 100 for fellowships. (The corresponding figures, broken down by source, are as follows: regular programme, $1 650 600: $460 000, $562 000 and $628 000; UNDP(SF) $184 200: $800, $183 400 and nil; UNDP(TA), $416 800: $23 800, $344 400 and $48 600; assistance in kind, $891 500: nil, $130 600 and $760 900.)

26. As in earlier years, regular programme and UNDP expenditures and unliquidated obligations at year's end exceeded by far the cash resources in respect of 1971 projects financed under those programmes. The explanation is that the 1971 figures include expenditures and obligations met from funds carried over from 1970 and prior years. Also of interest is the fact that the value of the technical assistance programmes being implemented by the Agency - based on the sum of expenditures during the year and the total of unliquidated obligations and assistance in kind outstanding at the year's end - passed the $6 million mark for the first time in the Agency's history in 1970, and exceeded the $8 million mark in 1971.

B. Distribution of assistance

1. By field of activity

27. A 1970:1971 comparison is given below of the amount of assistance provided in what were the top five fields of activity in 1971. Numerical data for all ten fields of activity are given in Figs 2A, 3A and 4A (which also include comparable data for 1970), in Fig. 5A and Table 5.

Assistance by field of activity and type: 1970 and 1971
(in thousands of dollars)

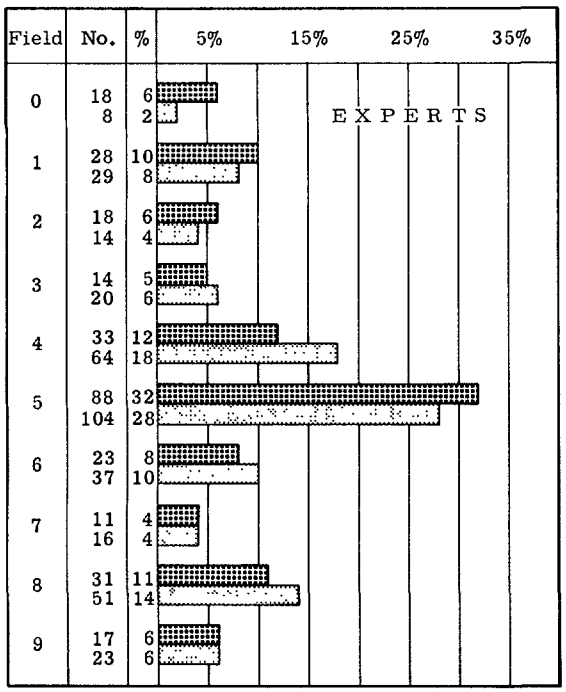
Field	Year	Experts	Equipment	Fellowships	Share of total programme	
		$	$	$	$	%
Application of isotopes and radiation in agriculture	1970	489.1	466.2	227.9	1183.2	29.7
	1971	516.7	595.6	355.7	1468.0	30.0
Nuclear engineering and technology	1970	234.7	148.3	255.1	638.1	16.0
	1971	313.7	78.3	276.3	668.3	13.7
Nuclear physics	1970	128.9	93.2	220.6	442.7	11.1
	1971	167.2	137.3	297.6	602.1	12.3
Prospecting, mining and processing of nuclear materials	1970	61.7	62.4	45.0	169.1	4.2
	1971	227.7	207.2	62.0	496.9	10.1
Application of isotopes and radiation in medicine	1970	68.6	105.4	168.9	342.9	8.6
	1971	131.9	119.4	170.2	421.5	8.6
Total	1970	983.0	875.5	887.5	2776.0	69.6
	1971	1357.2	1137.8	1161.8	3656.8	74.7
Total assistance	1970	1407.3	1249.6	1328.7	3985.6	100.0
	1971	1789.0	1488.8	1617.7	4895.5	100.0

FIGURE 2A

DISTRIBUTION OF EXPERT SERVICES BY FIELD OF ACTIVITY AND REGION: 1970 and 1971

Field	Year	Africa		Asia and the Far East		Europe		Latin America		Middle East		Inter-regional		TOTAL		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
0 - General atomic energy development	1970	4	5	3	3	-	-	2	6	-	-	9	2	18	16	6.4	2.2
	1971	4	12	4	5	-	-	-	-	-	-	-	-	8	17	2.2	2.1
1 - Nuclear physics	1970	3	16	2	4	4	9	9	29	1	3	9	3	28	64	10.0	8.7
	1971	1	7	6	33	7	11	6	26	1	3	8	6	29	86	7.9	10.5
2 - Nuclear chemistry	1970	-	-	8	31	4	18	6	21	-	-	-	-	18	70	6.4	9.5
	1971	1	7	5	20	6	16	2	3	-	-	-	-	14	46	3.8	5.6
3 - Prospecting, mining and processing of nuclear materials	1970	4	17	-	-	1	3	3	11	-	-	6	2	14	33	5.0	4.5
	1971	4	19	3	17	4	20	9	43	-	-	-	-	20	99	5.5	12.1
4 - Nuclear engineering and technology	1970	4	30	10	60	2	13	4	13	-	-	13	14	33	130	11.7	17.7
	1971	6	40	24	34	-	-	15	56	2	4	17	18	64	152	17.5	18.5
5 - Application of isotopes and radiation in agriculture	1970	15	90	17	80	10	16	22	46	2	13	22	8	88	253	31.3	34.5
	1971	14	85	33	83	10	14	15	19	4	9	28	9	104	219	28.4	26.7
6 - Application of isotopes and radiation in medicine	1970	1	2	2	4	2	6	3	10	2	14	13	6	23	42	8.2	5.7
	1971	1	3	4	12	6	10	7	20	5	18	14	3	37	66	10.1	8.0
7 - Application of isotopes and radiation in biology	1970	1	9	-	-	9	10	1	1	-	-	-	-	11	20	3.9	2.7
	1971	1	12	-	-	10	17	5	8	-	-	-	-	16	37	4.4	4.5
8 - Other fields of application of isotopes and radiation	1970	3	13	17	33	2	3	6	13	1	3	2	3	31	68	11.0	9.3
	1971	10	16	20	20	5	5	11	21	-	-	5	3	51	65	13.9	7.9
9 - Safety in nuclear energy	1970	4	10	-	-	2	2	10	21	1	5	-	-	17	38	6.1	5.2
	1971	2	6	13	7	2	2	6	19	-	-	-	-	23	34	6.3	4.1
GRAND TOTAL	1970	39	192	59	215	36	80	66	171	7	38	74	38	281	734	100.0	100.0
	1971	44	207	112	231	50	95	76	215	12	34	72	39	366	821	100.0	100.0

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

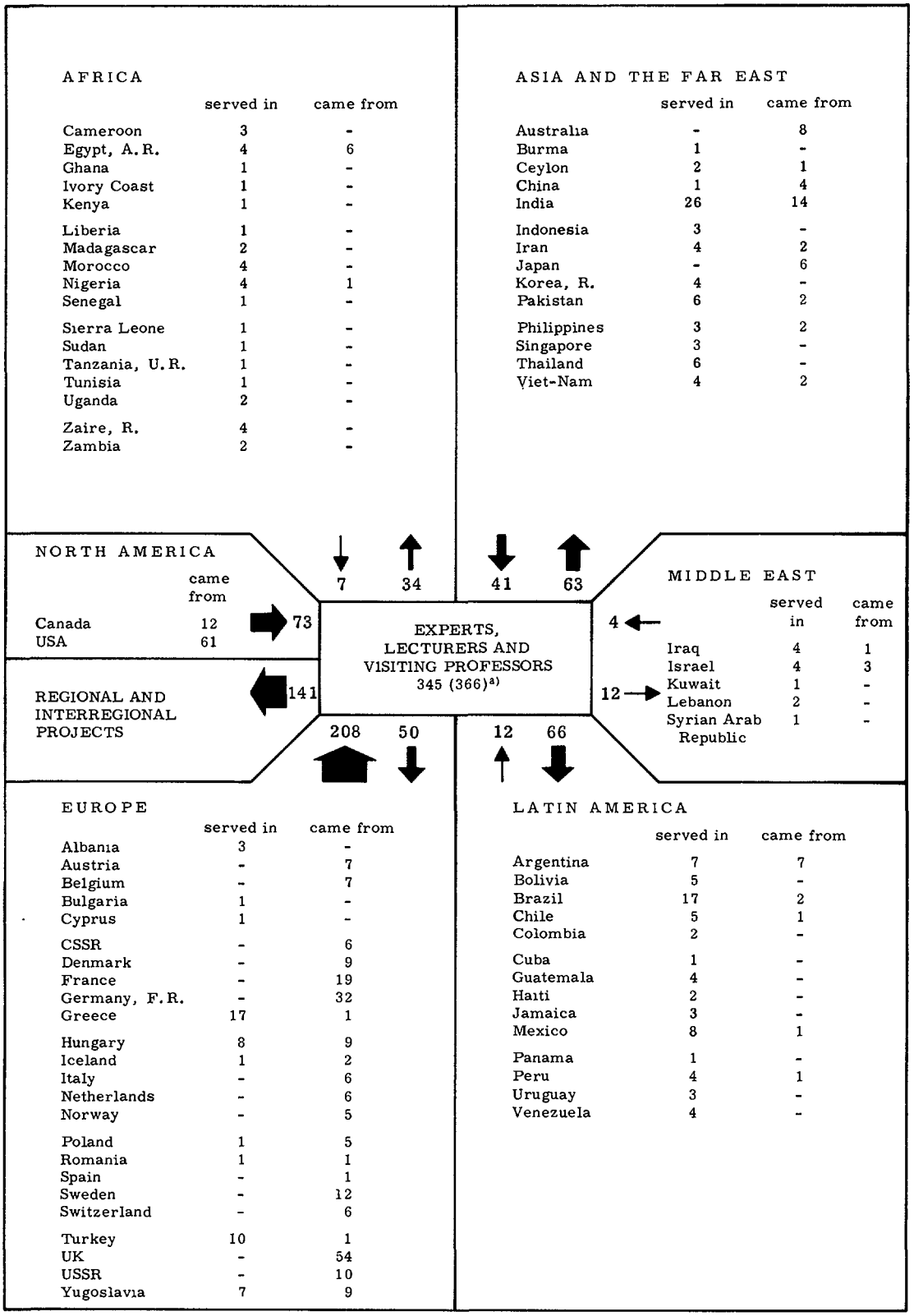


1970
1971

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

FIGURE 2B

DISTRIBUTION OF EXPERT SERVICES BY REGION: 1971

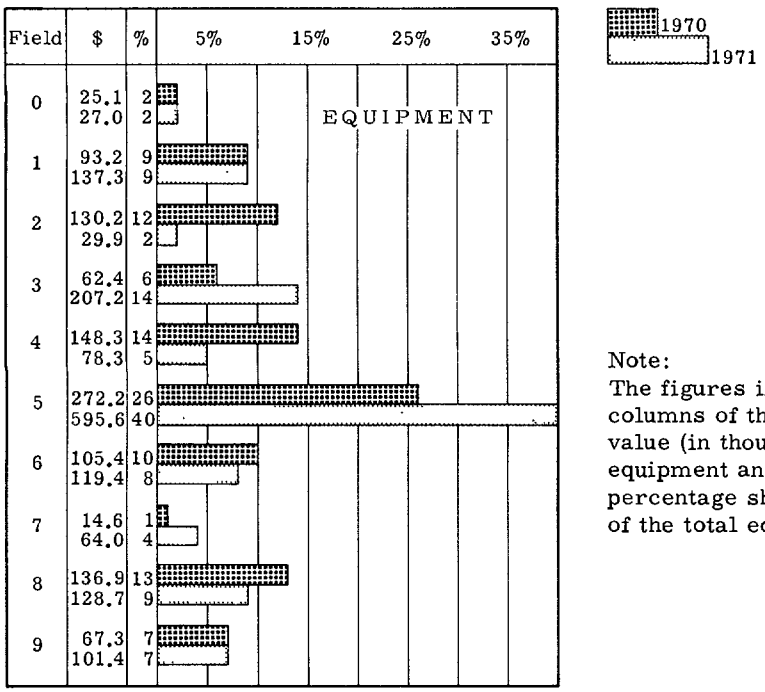


a) The difference in the number of assignments (366) and the actual number of experts (345) is due to the fact that 17 experts served in two and two in three different countries.

FIGURE 3A

DISTRIBUTION OF EQUIPMENT BY FIELD OF ACTIVITY AND REGION: 1970 and 1971
(in thousands of dollars)

Field	Year	Africa	Asia and the Far East	Europe	Latin America	Middle East	Inter-regional	TOTAL	Percentage of total
0 - General atomic energy development	1970	23.4	1.5	-	-	0.1	0.1	25.1	2.4
	1971	13.5	13.5	-	-	-	-	27.0	1.8
1 - Nuclear physics	1970	7.5	45.4	2.5	34.5	3.3	-	93.2	8.8
	1971	1.0	54.3	27.6	48.3	6.1	-	137.3	9.2
2 - Nuclear chemistry	1970	-	43.2	4.7	80.1	2.2	-	130.2	12.3
	1971	-	15.8	4.4	2.1	7.6	-	29.9	2.0
3 - Prospecting, mining and processing of nuclear materials	1970	13.0	-	7.6	31.7	-	10.1	62.4	5.9
	1971	10.9	134.7	40.7	11.1	-	9.8	207.2	13.9
4 - Nuclear engineering and technology	1970	59.5	40.1	-	16.3	14.5	17.9	148.3	14.0
	1971	8.4	5.8	12.6	47.1	0.9	3.5	78.3	5.3
5 - Application of isotopes and radiation in agriculture	1970	104.9	51.8	94.9	8.9	6.8	4.9	272.2	25.8
	1971	105.0	387.1	50.5	35.5	11.3	6.2	595.6	40.0
6 - Application of isotopes and radiation in medicine	1970	-	19.4	37.0	38.0	11.0	-	105.4	10.0
	1971	25.0	36.3	32.1	9.7	15.0	1.3	119.4	8.0
7 - Application of isotopes and radiation in biology	1970	1.1	-	3.2	10.3	-	-	14.6	1.4
	1971	25.4	2.6	32.2	3.8	-	-	64.0	4.3
8 - Other fields of application of isotopes and radiation	1970	3.0	36.2	44.5	53.2	-	-	136.9	13.0
	1971	15.5	45.3	28.3	39.6	-	-	128.7	8.7
9 - Safety in nuclear energy	1970	19.4	13.9	6.0	26.5	1.5	-	67.3	6.4
	1971	25.7	33.2	22.9	19.6	-	-	101.4	6.8
GRAND TOTAL	1970	231.8	251.5	200.4	299.5	39.4	33.0	1055.6	100.0
	1971	230.4	728.6	251.3	216.8	40.9	20.8	1488.8	100.0



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

FIGURE 3B

DISTRIBUTION OF EQUIPMENT BY REGION: 1971
(in thousands of dollars)

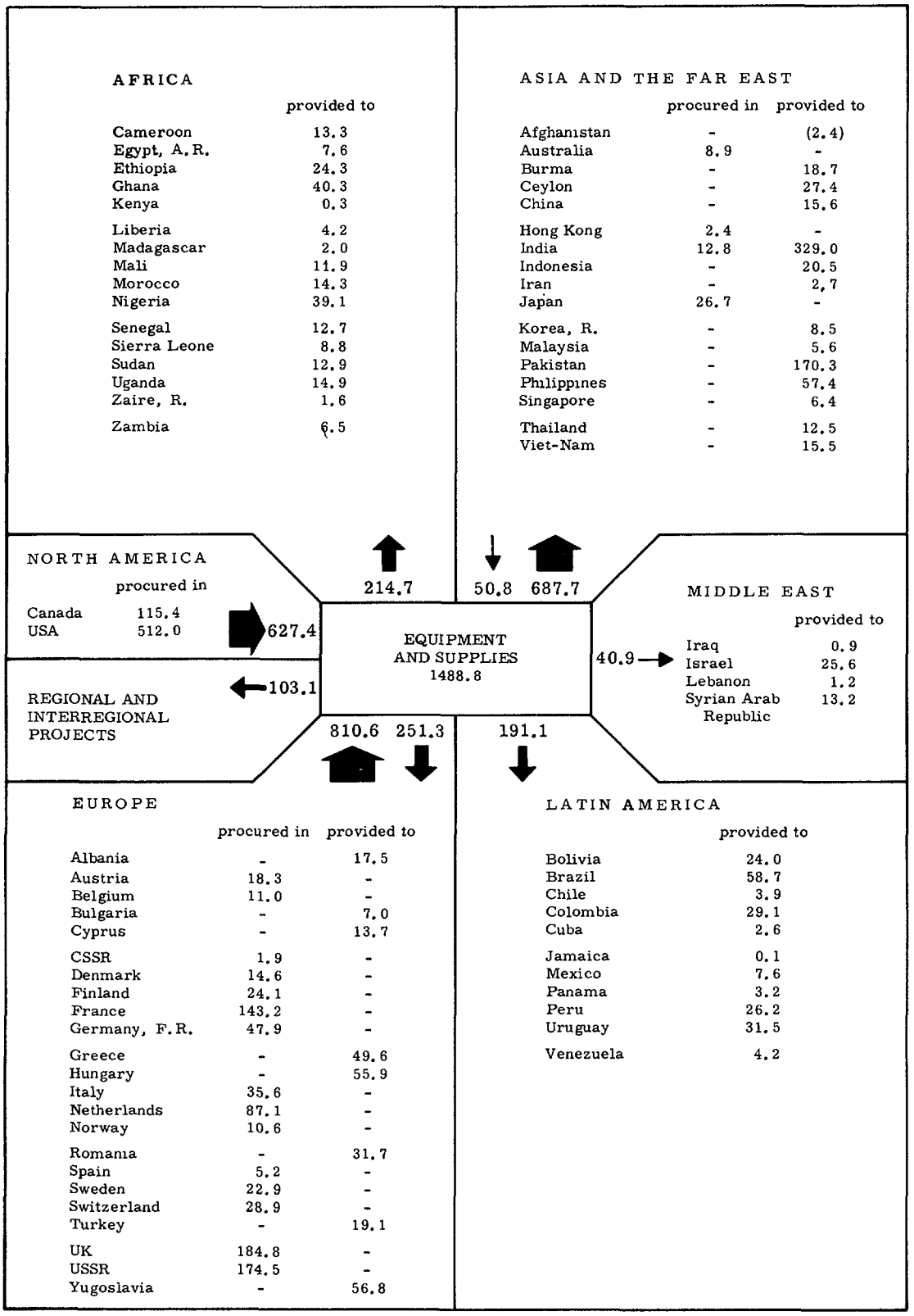
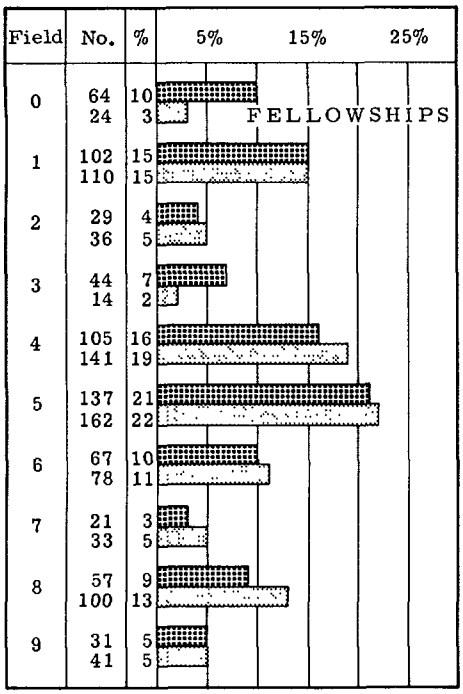


FIGURE 4A

DISTRIBUTION OF FELLOWSHIP AWARDS BY FIELD OF ACTIVITY AND REGION: 1970 and 1971

Field	Year	Africa		Asia and the Far East		Europe		Latin America		Middle East		Inter-regional		TOTAL		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
0 - General atomic energy development	1970	6	54	21	49	1	3	1	3	-	-	35	15	64	124	9.7	3.1
	1971	8	79	11	18	2	8	3	16	-	-	-	-	24	121	3.2	2.8
1 - Nuclear physics	1970	11	117	10	92	33	352	23	150	1	12	24	9	102	732	15.5	18.6
	1971	10	112	9	105	40	408	10	101	3	30	38	56	110	812	14.9	19.2
2 - Nuclear chemistry	1970	3	18	8	84	10	105	6	66	2	24	-	-	29	297	4.4	7.5
	1971	6	69	7	78	11	70	7	68	5	57	-	-	36	342	4.9	8.1
3 - Prospecting, mining and processing of nuclear materials	1970	2	15	7	48	3	24	2	24	1	12	29	54	44	177	6.7	4.5
	1971	2	18	5	32	-	-	7	55	-	-	-	-	14	105	1.9	2.5
4 - Nuclear engineering and technology	1970	7	51	34	333	23	206	12	133	5	58	24	72	105	853	16.0	21.7
	1971	9	74	43	241	43	439	11	115	9	79	26	50	141	998	19.1	23.5
5 - Application of isotopes and radiation in agriculture	1970	12	93	24	257	19	144	23	74	8	67	51	74	137	709	20.9	18.0
	1971	12	87	27	249	3	34	15	47	10	98	95	133	162	648	21.9	15.3
6 - Application of isotopes and radiation in medicine	1970	4	30	15	148	6	51	15	127	2	15	25	33	67	404	10.2	10.3
	1971	8	73	10	111	9	98	8	87	9	90	34	14	78	473	10.6	11.2
7 - Application of isotopes and radiation in biology	1970	4	29	9	99	4	38	2	20	2	24	-	-	21	210	3.2	5.3
	1971	5	55	7	75	12	100	8	15	1	12	-	-	33	257	4.5	6.1
8 - Other fields of application of isotopes and radiation	1970	1	6	19	59	9	85	8	50	2	22	18	26	57	248	8.7	6.3
	1971	32	87	36	74	8	80	2	24	4	42	18	16	100	323	13.5	7.6
9 - Safety in nuclear energy	1970	1	12	9	96	3	13	14	22	4	42	-	-	31	185	4.7	4.7
	1971	2	17	33	85	4	43	-	-	2	13	-	-	41	158	5.5	3.7
GRAND TOTAL	1970	51	425	156	1265	111	1021	106	669	27	276	206	283	657	3939	100.0	100.0
	1971	94	671	188	1068	132	1280	71	528	43	421	211	269	739	4237	100.0	100.0

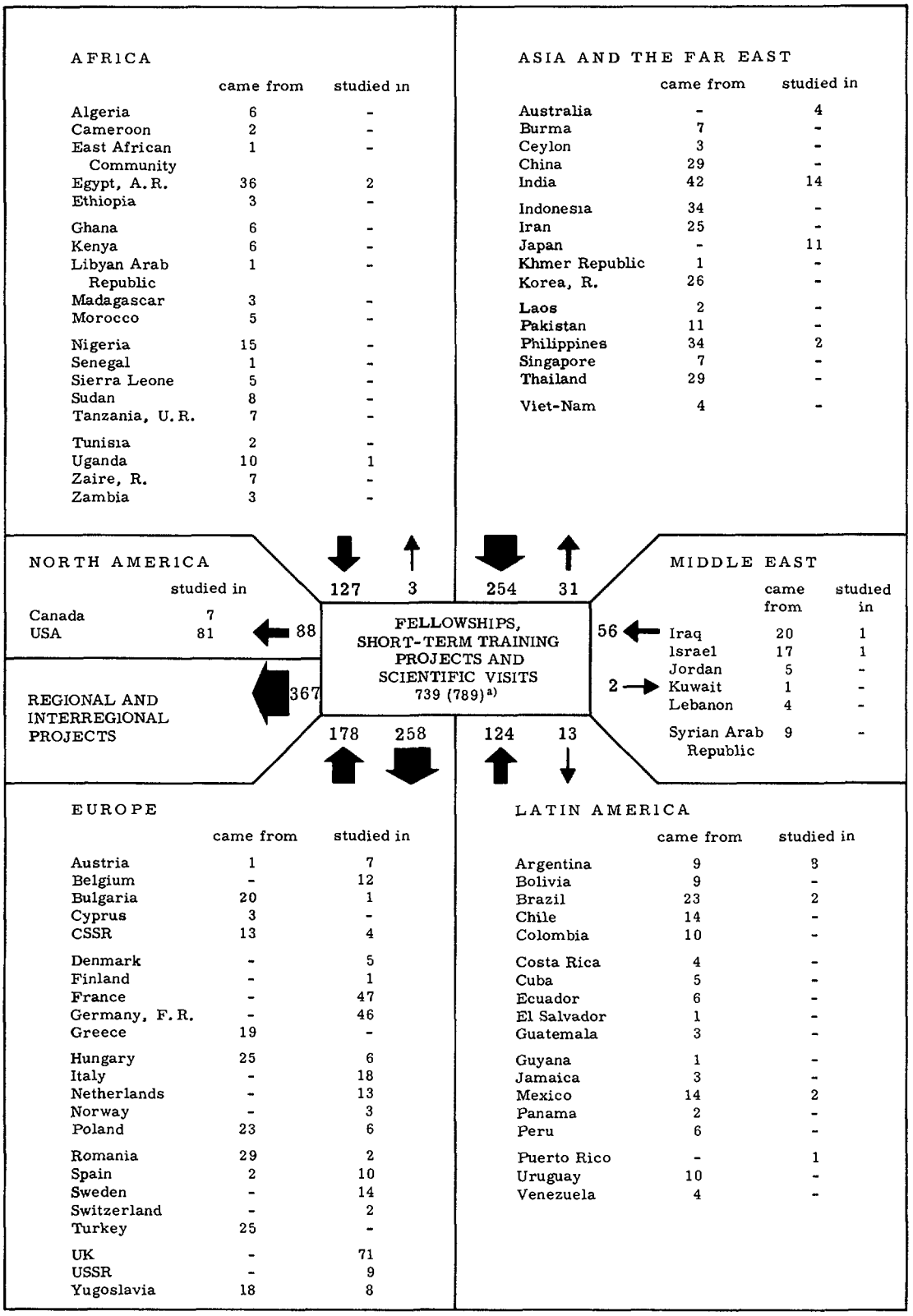
(1) Number of fellowship awards. (2) Number of man-months.



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

FIGURE 4B

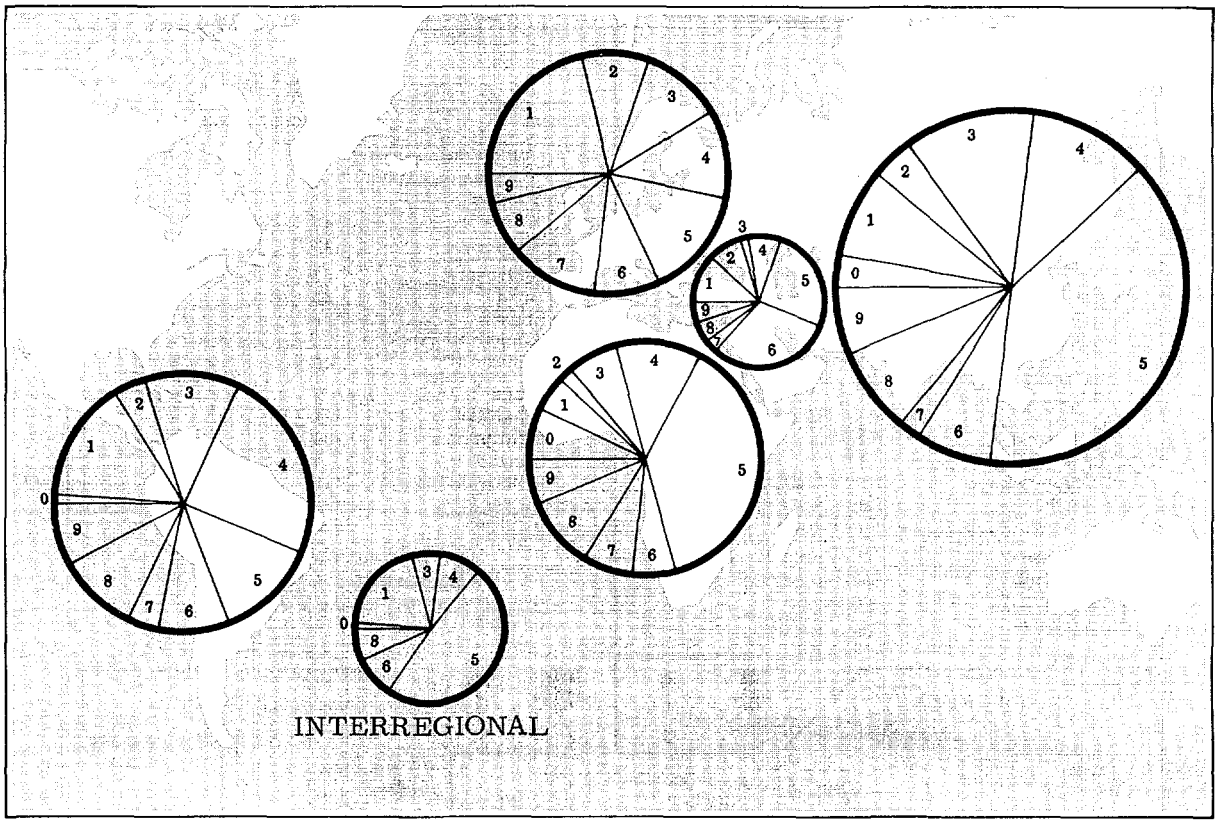
DISTRIBUTION OF FELLOWSHIP AWARDS BY REGION: 1971



a) The difference between the number of awards (739) and the number of places of study (789) is due to the fact that nine fellows studied in two, one in three and one in four different countries, whereas five holders of an award for scientific visits went to two, three to three, one to four, two to six, and two to seven different countries.

FIGURE 5A

DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD OF ACTIVITY AND REGION: 1971 [a)]



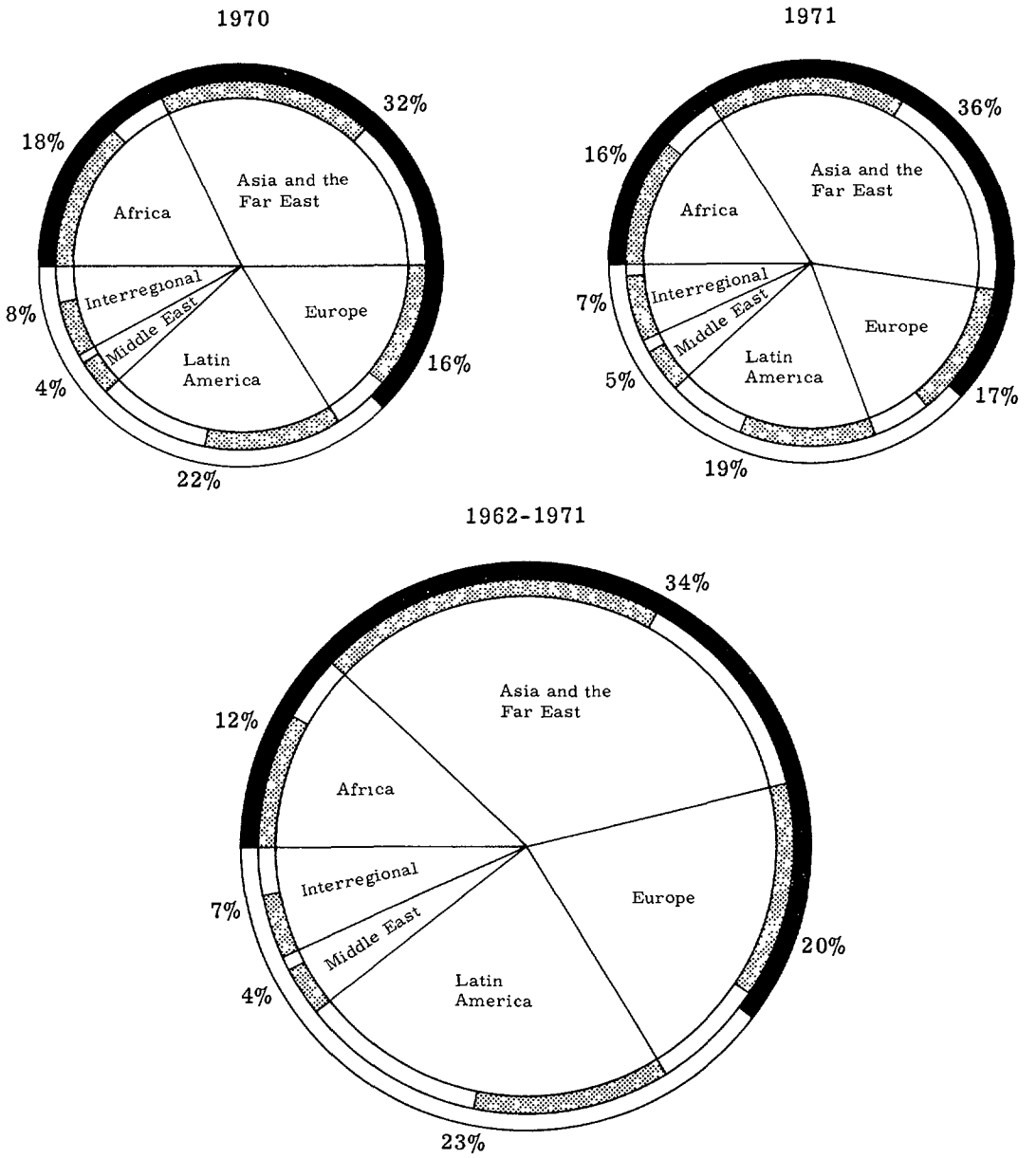
SUMMARY

Field	Africa %	Asia and the Far East %	Europe %	Latin America %	Middle East %	Inter-regional %
0 - General atomic energy development	7	3	-	1	-	1
1 - Nuclear physics	5	8	21	15	12	20
2 - Nuclear chemistry	2	4	9	4	8	-
3 - Prospecting, mining and processing of nuclear materials	7	12	11	12	2	6
4 - Nuclear engineering and technology	12	11	12	24	8	9
5 - Application of isotopes and radiation in agriculture	38	39	15	13	26	48
6 - Application of isotopes and radiation in medicine	6	7	9	9	31	9
7 - Application of isotopes and radiation in biology	7	2	12	4	3	-
8 - Other fields of application of isotopes and radiation	10	8	7	10	5	7
9 - Safety in nuclear energy	6	6	4	8	5	-
	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
(1970, 1971 and 1962-1971)

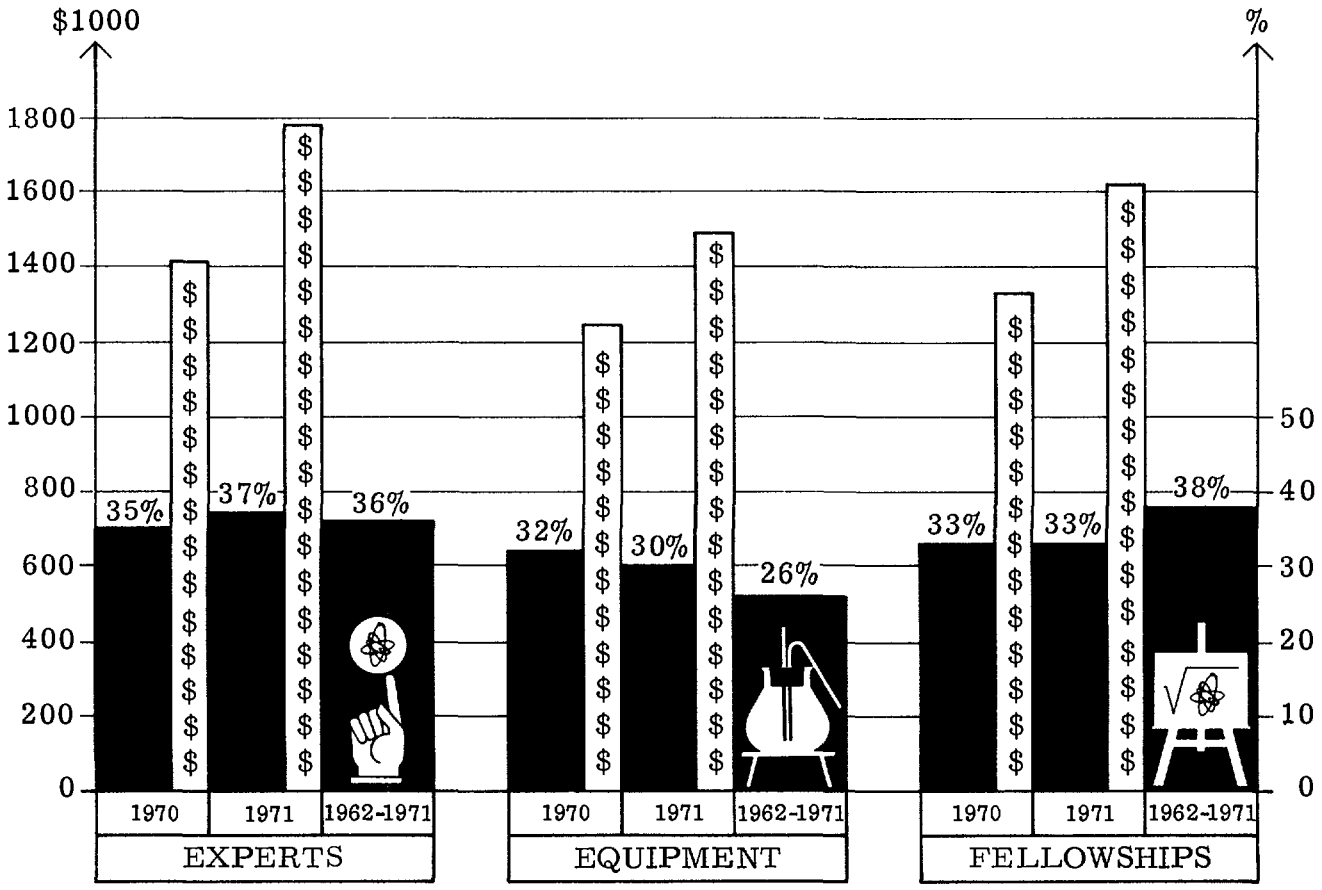


LEGEND (distribution of technical assistance by source):

INNER RING (regional distribution)	OUTER RING (overall distribution)	1970	1971	1962-1971
Regular programme	Regular programme	62.7%	61.6%	60.5%
EPTA-UNDP(TA)	EPTA-UNDP(TA)	28.0%	23.6%	29.1%
UNSF-UNDP(SF)	UNSF-UNDP(SF)	9.3%	14.8%	10.4%

FIGURE 6

DISTRIBUTION OF TECHNICAL ASSISTANCE BY TYPE OF ASSISTANCE
(1970, 1971 and 1962-1971)



TYPE	1970		1971		1962-1971	
	%	$1000	%	$1000	%	$1000
EXPERTS	35	1407.3	37	1789.0	36	11440.5
EQUIPMENT	32	1249.6	30	1488.8	26	8355.9
FELLOWSHIPS	33	1328.7	33	1617.7	38	11919.1
TOTAL	100	3985.6	100	4895.5	100	31715.5

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

2. By region and country

28. Detailed information on the distribution of technical assistance by region is given in tabular form in Figs 2A, 3A and 4A and summarized in Figs 5A and 5B. It will be noted that the largest variation shown in Fig. 5B is the increase in the assistance provided to countries in Asia and the Far East, from 32% of the total assistance in 1970 to 36% in 1971, which is attributable mainly to the expenditures in respect of the UNDP large-scale projects being executed by the Agency in that region; there was a corresponding reduction in the assistance provided to countries in Latin America from 22% of the total assistance in 1970 to 19% in 1971; the other percentage variations did not change by more than 2%.

29. More countries in Africa - namely, 21 - received Agency assistance in 1971 than in any other region; 17 Member States in Latin America received country programme assistance from the Agency in 1971, followed by the regions of Asia and the Far East, Europe and the Middle East with 13, 13 and 6 country programme recipients respectively. The varying levels of technological development achieved and the priorities Governments assign to nuclear energy activities in the recipient countries are clearly reflected in the country programme financial data, even though these fluctuate from year to year. That African countries receive less, on average, than the recipient countries in the other regions is not surprising. Moreover, the contribution nuclear energy applications can make - once a solid foundation is available - becomes apparent, for example, when it is noted that the assistance provided by the Agency to two countries in the region of Asia and the Far East in 1971 exceeded that provided by it to all recipient countries in Africa and equalled the assistance it provided to countries in the Latin American region. A great effort is being made to assist countries that are just beginning to introduce nuclear techniques and technology into their development schemes; the training course for laboratory technicians, which was carried out in Africa for participants from English-speaking countries in 1971, is but one example of how the Agency can help to make nuclear programmes more effective in these countries.

30. In 1971, 73 countries received technical assistance from the Agency, as compared with 68 countries in 1970. Including those which acted as hosts for short-term training projects and scientific visits, 36 countries both received and provided assistance in 1971 (29 in 1970). As in 1970, 19 countries provided but did not receive technical assistance in 1971, and 37 countries were recipients only (35 in 1970). Thus, 92 countries (87 in 1970) participated in the Agency's technical assistance programme in 1971. Figs 2B, 3B and 4B and Table 3 show the extent to which skills and knowledge were exchanged between countries.

3. By type of assistance

31. As shown in Fig. 6, the distribution of technical assistance in 1970, 1971 and over the period 1962-1971, by type, was as follows:

Period	Experts	Equipment	Fellowships
1970	35%	32%	33%
1971	37%	30%	33%
1962-1971	36%	26%	38%

A striking change in the distribution of Agency-provided technical assistance occurred in 1969, when the share of the assistance devoted to the provision of equipment reached the 27% mark, bringing the 1960-1969 overall equipment average to 23%; the comparable ten-year average for experts and fellowships was 35% and 42% respectively. It can be seen that the three elements of assistance will soon be allocated almost equal shares of the available resources.

(a) Experts, lecturers and visiting professors

32. In 1971, an unprecedented total of 345 experts, lecturers and visiting professors from 41 countries served a total of 821 man-months at a cost of $1 789 000 ($858 300 under the regular programme, $226 900 under UNDP(SF), $620 700 under UNDP(TA) and $83 100 in kind); the comparable data for 1970 were: 272 experts, lecturers and visiting professors from 39 countries provided 734 man-months of assistance at a cost of $1 407 300 ($665 600 under the regular programme, $149 000 under UNDP(SF), $532 200 under UNDP(TA) and $60 500 in kind). In addition, unliquidated obligations and assistance in kind outstanding at 31 December 1971 totalled $484 600 for expert services. Three experts each served in two countries, two experts each served in three countries, and 213 experts were assigned to one country only; of the latter, six also served as training course lecturers. A total of 58 countries (48 in 1970) were provided with country programme experts and visiting professors, and an additional 127 experts and lecturers (111 in 1970) assisted 22 regional and interregional projects (73 partly cost-free and 22 cost-free experts and lecturers were provided, as compared with 48 partly cost-free and 23 cost-free experts and lecturers in 1970). Having regard to views expressed in the Board of Governors to the effect that Agency staff members should be used for short-term technical assistance assignments, whenever practicable, in order to conserve scarce resources, one out of seven expert and lecturer assignments was carried out by Headquarters staff in 1970, and in 1971 every sixth such assignment was performed by a Headquarters staff member. Experts' final reports which became available in 1971 are listed in Annex IV.

(b) Equipment and supplies

33. Including the value of grants of equipment delivered during 1971, 52 countries and 16 regional projects (53 and 9 respectively, in 1970) were provided with equipment and supplies to a value of $1 488 800 ($531 800 under the regular programme, $475 900 under UNDP(SF), $275 900 under UNDP(TA) and $205 200 in kind), which represents an increase of 19% over the amount of $1 249 600 ($418 400 under the regular programme, $194 000 under UNDP(SF), $333 300 under UNDP(TA) and $303 900 in kind) provided in 1970, and is the largest amount of equipment provided by the Agency in any one year. An additional amount of equipment and supplies valued at $1 220 400 was still outstanding at the end of the year; this amount is included in the figures given in columns (9) and (10) of Tables 4, 7 and 8. In Fig. 7B, illustrating trends over the period 1962-1971, it can be seen that the value of the equipment provided in 1971 was more than three times greater than ten years earlier.

34. As in previous years, efforts were made to spread the purchases of technical assistance equipment and supplies over a large number of Member States. In 1970 as well as in 1971, those items were procured in 21 countries (see Fig. 3B, which also includes financial data in respect of equipment grants).

35. On occasion the Agency has been criticized for supplying complex equipment which some Governments might have difficulty in maintaining. The Agency always tries to supply the most appropriate equipment for the task to be performed, bearing in mind the necessity to follow the established purchasing practices, ensure that the equipment is compatible with the existing equipment, and make the best possible use of the available currencies. Maintenance problems arise from time to time, however, mainly because some Governments do not fulfil the obligation entered into under the terms of the transfer of title to the equipment to maintain it in working order and to make it available for subsequent Agency-assisted projects. Part of the solution to the maintenance problem is to have competent local staff available who are able to repair and service existing nuclear electronic equipment. The importance attached to this matter by the Agency prompted it to hold a training course in each of the last three years for technicians in the maintenance and repair of nuclear electronic equipment.

36. Maintenance of the equipment supplied by the Agency requires foreign exchange for the procurement of the necessary spare parts; spare parts are purchased and shipped, where practicable, together with the items of equipment. The spare parts problem, including the matter of deciding which parts should be kept on hand, would be much easier to solve if the equipment used in various institutes were limited to a minimum number of makes selected on the basis of performance, compatibility and interchangeability of spare parts and components. Unfortunately, this is often precluded by the limited resources available to the Agency and to recipient countries for the purchase of scientific equipment under bilateral arrangements.

37. Special efforts are made to meet the needs of requesting Governments. The Agency distributes to recipient countries printed forms on which Governments are asked to indicate the intended uses and technical specifications of the requested equipment, special requirements (for example, whether the equipment should be tropicalized and/or be compatible with existing equipment), voltage, etc. Difficulties can arise when the equipment is used in an institute other than that foreseen and when the background information provided to the Agency in the request for equipment does not give a clear picture of the detailed needs of the institute and the work for which the equipment is required. In their own interest Governments are asked to provide all the essential details when drawing up their requests and thus contribute to the effective procurement of scientific equipment by the Agency.

(c) Fellowships

38. A total of 739 candidates from 67 countries received fellowship awards under the training programme in 1971 (see Fig. 4B and Tables 3 and 6) as against 657 candidates from 68 countries in 1970. The number of man-months of training awarded was 4237 in 1971 as against 3939 in 1970. Although more Type I and UNDP country programme awards had been made in earlier years, the total number of 739 participants in the Agency's training programme in 1971 (not counting awards for study at the Trieste Centre, which were financed from non-technical assistance resources in 1970 and 1971) was 82 more than recorded for 1970, which had been the best year. This high figure is due primarily to the large increase in the number of participants in short-term training projects (from 280 award holders in 1970 to 340 in 1971) and to the sizable increase in Type II country programme awards (from 163 in 1970 to 200 in 1971); although Type II awards represented more than 50% of total country programme awards twice before 1971, the latter year's figure of 200 Type II fellowships exceeds the previous record by about 30 awards. There was a modest decrease in the number of Type I and UNDP country programme awards (from 159 and 40, respectively, in 1970 to 155 and 24 in 1971).

39. The value of the training provided by the Agency in 1971 is also the highest amount on record for any one year, namely, $1 617 700 ($734 200 under the regular programme, $23 300 under UNDP(SF), $216 100 under UNDP(TA) and $644 100 in kind) as compared with $1 328 700 ($535 300 under the regular programme, $20 600 under UNDP(SF), $240 100 under UNDP(TA) and $532 700 in kind) in 1970. The 1971 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 1971, amounting to $1 438 000. This amount is nearly $150 000 higher than the combined total of these two items at the end of 1970 and holds promise of a training programme likely to reach $1 700 000 in 1972; the corresponding 1973 programme will probably be below $1 500 000.

40. A comparison of the nominations and awards for country programme fellowships in 1970 and 1971 and of all technical assistance awards made during these two years is given below. The number of country programme awards rose by 6% and those for short-term training projects by 21%. It is also interesting to note that, for the first time in the history of the Agency's fellowship programme, the percentage of nominations which led to effective awards exceeded 75%. (The data relating to the country programme awards given below do not include nominations and awards in respect of fellowships financed from Trieste Centre funds and therefore differ slightly from the data in paragraph 77 below.)

Country programme awards	1970		1971	
Nominations received		484		508
Effective awards [6]				
Individual projects	338		354	
International projects	24	362	30	384
Percentage of nominations which led to effective awards		74.8%		75.6%
Other international training awards				
Scientific visits	15		15	
Short-term training projects	280		340	
TOTAL AWARDS	657		739	

(d) Regional and interregional activities

41. In 1971, the Agency conducted 23 regional and interregional training projects in 27 different countries, in which there were 479 participants from 69 different countries. The cost of attendance of 340 participants from 58 countries was paid out of project funds (Agency resources in kind, under the regular programme and under UNDP); the cost of attendance of 139 participants, including 126 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 340 awards financed from Agency resources.

42. Fifteen of the 23 regional and interregional training projects related to the application of isotopes and radiation (seven in agriculture, three in industry, two in general uses, one in biology, one in isotope hydrology and one in medicine); in addition there were two projects in nuclear physics, two in radiation protection, one in the maintenance and repair of nuclear electronic equipment, one in nuclear power project evaluation, one in the production of radiopharmaceuticals, and one consisting of a training and demonstration programme on advanced atomic energy technology. Further details on the location, attendance, financing, etc. of these projects are given in Annex II.

(e) Follow-up missions

43. In 1971 four one-man missions and one two-man mission were sent to the regions to determine needs and discuss development plans with requesting countries. The cost of sending staff members on these missions averaged $183 for each of the 25 countries visited.

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[6] Total number of awards less withdrawals after award as at 31 December 1970 and 31 December 1971, respectively.

C. UNDP large-scale project activities

1. General

44. With the approval in 1962 of the first UNSF project to be executed by the Agency, a modest programme was begun with a view to ensuring that the peaceful applications of nuclear energy could make a more effective contribution towards economic and social development in the recipient countries. Large-scale projects of this kind, as they are now categorized in UNDP, are not experimental in nature but are designed to introduce the use of nuclear techniques and technologies already proven sound from the standpoint of economics, effectiveness and safety; moreover, as they frequently offer advantages which are either unobtainable or prohibitively expensive to obtain by using conventional methods, some of these new techniques and technologies are certain to make a relatively early and sizable impact on the economic sector concerned. However, as those involved in the development of an adequate scientific infrastructure are aware, the scope and nature of such projects make it necessary that certain conditions be met before the projects can be expected to succeed. In order to meet these conditions fully, a country would need to have the resources required to initiate such projects, namely sufficient trained personnel ranging from laboratory technicians to senior research workers, the basic tools required for their work (equipment, laboratories and grounds) and an extension service through which those who could benefit from the project could make use of the advice and services provided and the results achieved.

45. As can be seen below, more UNDP large-scale projects have been approved in agriculture than in any other activity, and more have been approved in recent years than ever before; the addition of new activities indicates the ability of developing countries to make effective use of a growing number of nuclear energy applications.

Large-scale UNDP projects approved for execution by the Agency

Field of activity	UNDP Governing Council approvals						
	1962/3	1964/5	1966/7	1968/9	1970/1	1972[a/]	Total
Nuclear research in agriculture	1	2	-	1	-	1	5
Power surveys, including nuclear power	1	-	-	-	-	-	1
Establishment of a nuclear energy research centre	-	-	-	-	1	-	1
Prospection for nuclear raw materials	-	-	-	-	2	-	2
Industrial applications	-	-	-	-	2	-	2
Total	2	2	-	1	5	1	11

a/ Does not include any large-scale projects foreseen in the country programmes approved at the January 1972 or at the June 1972 sessions of the UNDP Governing Council.

46. UNDP's cash contribution towards meeting the cost of field operations in respect of these projects - on the average about $0.7 million per project - ranges from $0.3 to $1.4 million. With the introduction of new UNDP programming procedures in respect of assistance to be provided as from January 1972 (see paras 13-18 above), comparison in future will be somewhat more difficult because every project involving more than $100 000 in UNDP funds will constitute a "large-scale" project.

47. Through a combination of normal means of assistance, including advisory services, regular programme assistance and special missions, the Agency has aided developing countries in determining their needs as well as the way in which they could best be met. To meet the wishes of some countries, the Agency has also helped in preparing the formal requests of Governments to UNDP for large-scale project assistance. The observations set out in paragraphs 48-60 below, which relate only to current projects and others to be started in the immediate future, show some of the ways in which the Agency can assist the developing countries.

2. The eradication of the Mediterranean fruit fly in Central America

48. The results of this project will contribute towards devising reliable methods of combating the Medfly, the tsetse fly and numerous other insect pests all over the world. It is to be noted, in particular, that the project has resulted in a reduction in the cost of rearing insects in the laboratory to a fraction of the initial cost, due to improved procedures and the discovery of a cheap diet medium, and the development of better methods of marking, packaging, transporting and releasing sterilized insects and of trapping flies. Furthermore, the sterile insect release method greatly reduces the need for insecticide applications and it can be used effectively for the control or, if coverage is comprehensive, the eradication of insect pests.

3. Nuclear research in agriculture in India

49. This project is not only the biggest to be executed by the Agency so far but also the most complex. Field operations comprise the co-ordination of work programmes of four different research centres, located at some distance from one another, and the conduct of lungworm vaccine experiments in remote hill regions of Kashmir. In these project activities use is made of the results of work done in the advanced countries; the staff associated with, and technical innovations developed during, a similar Agency-executed project in Yugoslavia have also contributed towards the success of the project in India, thus demonstrating that the impact of a successful project can extend far beyond the recipient country.

50. At the site of the Indian Agricultural Research Institute (IARI), a new nuclear research laboratory was constructed and inaugurated in 1971; the Agency assisted in the selection and provision of equipment. Extensive IARI work programmes concentrate on improvements in plants and soils to increase food production. With regard to plant breeding and genetics, work is being carried out, by means of induced mutations and cross-breeding, to develop plant varieties that are high yielding, more resistant to disease, easier to harvest by machine, mature earlier, incorporate improved cooking and nutritive qualities (for example, increased protein and amino acid content) and correspond more closely to consumer preference as to colour and taste. Soil science work includes studies on soil fertility, fertilizer use and plant nutrition, water utilization, etc. In addition, research is being conducted on the control of insect pests and disease with a view to developing efficient pesticide and fungicide application methods, and studies are being carried out on pesticide residues in crops.

51. Project activities at the Bhabha Atomic Research Centre (BARC) are mainly in support of IARI studies on induced mutations for improvement of important agricultural crops, the sterile insect release technique for pest control, insect attractants and repellents, and work on the development of insect pathogens.

52. Although the work programmes drawn up for the Indian Veterinary Research Institute (IVRI) foresee promising studies on trace elements in animal nutrition, growth and reproduction hormones, etc., it is the successful development - in co-operation with BARC - of radiation attenuated vaccine to combat lungworm disease in young sheep and goats that is commanding widespread attention. Plans are being made to produce 100 000 doses of this vaccine annually, for use in enlarged field trials, and to decentralize vaccine production but centralize research work at IVRI. The priority the Government has given to this activity is reflected in the 1972-1979 country programme in which the provision of additional assistance, valued at about $1 million, for this project has been requested.

53. At the National Dairy Research Institute project activities consist of studies on nutrient metabolism with reference to milk production, synthesis of milk protein and, in collaboration with BARC, radiation sterilization of packaging materials for dairy products.

4. Uranium exploration in Greece and Pakistan

54. In Greece the object of the project is to survey, that is, to locate and define, areas whose geology indicates the likely presence of uranium; the detailed work to develop favourable deposits lies beyond the scope of the project. Field operations call for a carborne radiometric survey of the region and, based on the results, detailed prospection by means of airborne, ground and geochemical surveys of selected areas. The analysis of the survey data related to the number, extent and significance of nuclear raw material occurrences is to form the basis of the recommendations to the Government on future exploration programmes.

55. In Pakistan the extent and the economic potential of known occurrences of uranium minerals and radioactive anomalies are to be determined so that the Government can decide on the future development of ore-bearing areas, possibly leading to full-scale exploitation. By means of radiometric ground surveys and by pitting and trenching, the best sites for drilling samples are being located. Whether non-coring or coring, shallow or deep drilling methods will be used in individual areas will depend on survey results. Evaluation will be carried out by calibrated radiometric logging of drill holes and the examination and assaying of drill hole samples; sub-surface profiles and geological maps of significant mineral deposits will be prepared. Finally, a calculation of ore reserves and their economic potential and estimates of likely production costs are to be prepared, together with recommendations for future work.

56. The project in Greece consists of a mineral resource survey with emphasis on geochemical exploration techniques, to cover extensive areas not readily accessible for radiometric survey by traditional means, and a laboratory analysis of samples. The scope of the Pakistan project is much narrower, mainly because extensive preliminary survey work has already been done; emphasis is placed on the determination of the extent and quality of ore reserves and the calculation of the cost of their exploitation. Exploration projects of this kind are important because the known reserves of nuclear raw materials are not considered sufficient to meet anticipated long-term demands. In addition, the discovery of favourable deposits of uranium constitutes a potential source of export earnings and holds out the promise of independence in the matter of the supply of fuel for power reactors for developing countries. These projects will be implemented in association with the United Nations.

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

57. Under this project a 300 000 curie cobalt-60 irradiation facility is being established to sterilize cotton dressings, surgical sutures, disposable hypodermic syringes and surgical tubing, etc. as a service to the pharmaceutical industries supplying hospitals in the Bombay area. Research will also be conducted to determine the feasibility of the irradiation sterilization of, and market for, additional disposable

medical products. In the post-demonstration stage it is planned to operate the plant with a 1 000 000 curie cobalt source, thus tripling the throughput capacity, so as to process approximately 10 000 cubic metres of medical products annually. Furthermore, this plant will serve as a prototype for the construction of similar facilities to provide radiation sterilized medical products for other hospitals in India.

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

58. The non-destructive testing (NDT) group of the National Atomic Energy Commission (CNEA), together with the staff from CNEA's metallurgy departments and the Technical Assistance to Industry Service, constitute the Technology Branch of CNEA. Under this project a new centre will be built and the NDT group will be expanded. One of the primary objectives of the project is the introduction of the full range of NDT techniques for industry in Argentina in order to improve the quality of engineering and of manufactured products. The new centre is intended to meet the need for a central, modern equipped facility for advising and assisting industry in the solution of complex and non-routine NDT problems. In addition, the centre will operate a mobile laboratory equipped with radiographic, ultrasonic and magnetic NDT equipment to provide an on-the-spot NDT service anywhere it is required in Argentina. The project will be implemented in association with UNIDO.

7. Nuclear research in agriculture in Brazil

59. The National Nuclear Energy Commission will work together with the Agency to expand and improve the training and research programmes of the Centre for Nuclear Energy in Agriculture of the Luiz de Queiroz Agricultural College, which is a branch of the University of the State of São Paulo. Project activities will include training and research programmes in soil fertility, plant nutrition, bio- and radiochemistry, dosimetry, health physics, radiology and biophysics, soil science, plant breeding, hydrology, ecology, plant pathology and microbiology, entomology and animal science. It is expected that this project, one of many launched by the Government to promote increases in the country's agricultural production, will lead to co-ordinated and co-operative nuclear-technology-based training and research programmes among federal and state agricultural research centres.

8. National nuclear energy centre in Chile

60. A centre specializing in nuclear research in agriculture, industry, medicine, etc. is to be established by the Chilean Nuclear Energy Commission at the site of a newly-completed research reactor. The objectives of this multipurpose project include the provision of international experts for the commissioning of the reactor, followed by training programmes for engineers, scientists, medical personnel and technicians, the production of long-, medium- and short-lived radioisotopes for a variety of applications in the areas mentioned above, the establishment of test facilities, especially for industry, and the development of the capability to carry out technical and economic studies and research involving the application of isotopes and radiation. The benefits to be derived from the centre's modern nuclear technology are expected to have an important impact on the national economy.

D. Evaluation of technical assistance programmes

1. General

61. After an interval of two years, during which the review by ECOSOC and its subsidiary bodies of the "Study of the Capacity of the United Nations Development System" [7] and the elaboration of the consensus approved by the Governing Council [8] were completed, the Inter-Agency Study Group on Evaluation resumed its consideration of evaluation as applied to the technical co-operation activities of the United Nations system. This Group, in which the Agency is represented, paid particular attention to draft supplementary guidelines for the evaluation of UNDP country programmes, including the evaluation of individual projects. The Group is useful to the Agency since it serves as a clearing-house for all evaluation matters and a forum where intersectoral aspects of participating organizations' development aid can be fully considered.

62. Large-scale and small-scale technical assistance projects are designed to meet gaps in a recipient Government's economic and scientific development plans which it cannot fill from its own resources. The effect of multilateral assistance is, therefore, likely to be fractional and, consequently, it is difficult to assess its impact in isolation from the broader scope of science and technology of which it usually forms a part. Most developing countries plan and schedule the use of the assistance they expect to receive from outside sources in accordance with a formal development plan covering a span of three to five years, which is usually subject to annual review. The assessment of the impact of such assistance is an important obligation of the Government, both from the point of view of its own domestic investment policies relating to development and the way in which external aid should be apportioned within the country. The United Nations organizations providing development aid carry out, as a matter of established procedure, their own evaluation and assessment of programmes; they do so in accordance with the consensus approved by the Governing Council and, where appropriate, in co-operation with the Government technical authorities concerned, and with a view to ensuring the most effective formulation of requests for, and implementation of, multilateral aid. The procedures followed by the Agency in its evaluation and assessment were described in last year's report [9] and some of those designed to keep administrative costs to the minimum are described in paragraph 19 above.

63. In so far as the effect of Agency assistance is fractional in most national development plans, its maximum potential will only be reached if adequate national counterpart facilities are available at the time of project formulation, during the implementation of the project, and after the provision of Agency assistance has been completed.

64. The availability of Government counterpart funds for the purchase of equipment produced locally, the payment of local labour and the provision of transport and other facilities is essential. In several cases the Government stated that such funds were available but, in practice, none were provided; the projects in question were nevertheless successful, largely due to the fact that the experts selected were outstanding and devoted individuals who were prepared to do their utmost despite all obstacles. In this connection, however, it is regrettable that many recipient Governments do not fulfil the conditions laid down in the exchange of letters with the Agency under which the Government agrees to provide local transport, secretarial help, office space, office equipment and other required support for expert assignments.

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[7] United Nations document DP/5.

[8] See United Nations document E/4884/Rev. 1, Chapter V, Annex.

[9] GC(XV)/INF/131, paras 76 and 77.

2. Co-operation with other United Nations organizations

65. Since, in addition to the use of nuclear technology to promote development conventional methods are also used, it is evident that the Agency's technical assistance will impinge upon aid provided by other United Nations organizations. Duplication is avoided and co-ordination achieved, at the country level, when programmes are formulated by government departments in conjunction with advisers from United Nations organizations, as can be seen from the following examples. The Agency continues its co-operation with UNESCO in the granting of fellowships in allied fields, particularly relating to the creation of an adequate scientific infrastructure. The facilities of ILO's Turin Centre have been utilized by the Agency during the past three years for training courses in the repair and maintenance of nuclear electronic equipment. A large-scale project in Argentina is being carried out in association with UNIDO, and a joint mission of IAEA and UNIDO staff members elaborated the objectives of the project; in radiopharmaceutical projects in Hungary and India the marketing aspects and certain other activities of interest to UNIDO have been programmed jointly. The large-scale projects concerned with the development of nuclear raw materials in Greece and Pakistan are carried out, in accordance with ECOSOC Resolution 1550 (XLIX), in association with the United Nations. Similarly, the third phase of a United Nations mineral resources and ground-water survey in Somalia, which is also concerned with the development of uranium resources, will be carried out by the United Nations in association with the Agency.

66. With regard to all applications of nuclear technology in agriculture, the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture ensures close co-ordination of development aid between the two organizations. In addition, hydrological studies involving the use of radioisotopes in the provision of water for agricultural purposes are co-ordinated through sub-contracts with FAO whenever that organization is the project executing agent. A similar procedure is followed in respect of projects designed to develop water resources undertaken by the United Nations, WHO and UNESCO.

67. Another activity which has been well received by scientists and educators in developing countries is the series of panels on nuclear science teaching sponsored jointly by the Agency and UNESCO. The next panel in this series is planned to be held in Athens within the next 12 months. It should also be mentioned that the Agency co-operates with WHO in the training of personnel in the use of isotopes and radiation in medicine, the application of physics in radiotherapy, and radiation protection and safety.

3. The integration of atomic energy activities at the national level

68. With regard to the assistance which is provided by the Agency with a view to contributing towards the success of specific development projects in Governments' economic and social development programmes, it is essential that the atomic energy authority be as closely associated as possible with the technical ministries responsible, for example, for power supply, irrigation water, industrialization, agricultural production, etc. Whilst the atomic energy authority may act as a catalyst and a co-ordinator of the utilization of nuclear techniques in development plans, it is important that it should be an ex-officio member of planning bodies and maintain a close relationship with the appropriate national technical service. It has been noted in at least one country that closer co-operation is required between the Government's co-ordinating body for external assistance, the national economic development board and the atomic energy authority. Elsewhere, the way in which project aid was used showed that there was an inadequate degree of co-operation, co-ordination and interdependence not only between the departments in a national university but between it, other institutions, public and private planners and potential users of the assistance provided. In another country the failure of the central atomic energy authority to acquaint national agricultural and hydrological services with the uses of radioisotopes, for example, resulted in the authority's absorption into a federal scientific and technical research

committee; expert advice has now been given by the Agency on the best manner in which the services of the authority could be integrated with the plans and services of the conventional ministries. A similar situation has been avoided in several countries embarking on the use of nuclear power in which the atomic energy authority, while maintaining its paramount position, works in close co-operation with the electricity generating authorities and national power corporations. Care has been exercised in the planning of nuclear power projects in all countries concerned to ensure that the need for adequate co-ordination at the national level is taken into consideration.

4. The contribution of the international expert

69. In the case of evaluations carried out jointly with recipient Governments, a random sample has revealed the generally high calibre of Agency experts on assignment in 1971. One Government mentioned that the work of experts is now more effective than in the past; previously the Government had noted a tendency for experts to carry out projects by themselves, partly because of the lack of appropriate counterpart staff or personal difficulties due to differences in language and culture. The Government mentioned that the assignment of experts for short periods was not only extremely effective, but also had the advantage of making the counterpart realize that he would have to continue the work by himself within a short time. This also tends to prevent the counterpart from leaving his post, since he realizes that he will occupy a position of responsibility. Some of these difficulties were overcome in another country thanks to the adaptability of the expert who, besides improvising in the fabrication of equipment, partly because of the lack of counterpart funds, maintained excellent working relations with his counterpart colleagues. In other instances the effectiveness of aid was greatly enhanced by return visits for short periods by experts who had previously served in the country on a long-term basis and whose knowledge of the culture and background proved invaluable. The advantage of short-term assignments becomes particularly apparent where a "team approach", involving the services of several experts, is adopted; in one project, this approach made it clear that local staff could usefully employ nuclear techniques in hydraulic studies, and in another project it made an immediate impact on highway construction by solving vital density/moisture problems. These short-term assignments are often also the starting point for long-term projects requiring aid over several years, usually financed under UNDP. The technical field of activity involved may also be a determining factor in the duration of an expert's assignment; for example, many agricultural projects require the services of an expert over the full season, and instruction in electronic maintenance and repair takes longer than, say, the actual initiation of a metallurgical process. Experience has also shown that the transfer of knowledge and skills, whenever practicable, should take place in the environment in which they will later be utilized, but when the infrastructure is lacking the transfer of technical know-how is bound to take longer than in a developed country with its more sophisticated educational system and greater resources; for this reason a number of intermediate and long-term assignments of experts will always be required to provide programme flexibility.

5. The effectiveness of nuclear equipment

70. It has long been recognized that the use of nuclear technology to promote development requires a larger investment in equipment than many other disciplines. The nature of the equipment is such that special technical training to operate it is often required. Moreover, unfamiliarity with the benefits to be derived from the equipment provided and the absence of technical training in its uses sometimes result in a lack of co-operation and interest by Government technical services not directly concerned with nuclear technology. In one country this attitude has prevented the full or more extensive utilization of equipment provided by the Agency. The equipment is generally provided together with an internationally recruited expert who must install it, demonstrate its operation and endeavour to ensure that his counterparts learn how to maintain and service it, all in a relatively short space of time. This is not always possible but considerable effort is made to see that the counterpart facilities, both in personnel and

funds, including foreign exchange for the purchase of spare parts, are available before the equipment is sent. In one country, however, it is reported that customs procedures continue to constitute a greater handicap to effective utilization and maintenance than any other factor. The obligations of the recipient Government in respect of equipment provided by the Agency are stressed at the time of the assessment of the initial request; attention is again drawn to these obligations in the transfer of title to the equipment - on completion of expert assistance - in which the Government undertakes to maintain the equipment and make it available in the event that any further expert services are provided in connection with which the equipment is needed.

6. The importance of training

(a) The fellowship programme in 1971

71. In 1971 the Agency granted a total of 395 fellowship awards for individual study abroad to nationals of 58 countries. As noted in last year's report, the annual distribution of awards by field of activity has remained fairly constant, except for year-to-year statistical variations which usually do not indicate a shift in emphasis between subjects. [10] The distribution of awards by field of activity over the period 1958-1970 and in 1971 has been as follows:

Field of activity	Distribution of awards (in %)	
	1958-1970	1971
General atomic energy development	1	4
Nuclear physics	21	17
Nuclear chemistry	11	10
Prospecting, mining and processing of nuclear materials	4	2
Nuclear engineering and technology	22	23
Application of isotopes and radiation in:		
Agriculture	13	11
Medicine	11	11
Biology	6	8
Other fields	4	6
Safety in nuclear energy	7	8
	100%	100%

72. Although the data for 1971 show no striking changes from the distribution over the previous 13 years, there is evidence that nuclear applications are now receiving more emphasis, with a corresponding decrease in requests for training in basic scientific disciplines. This is to a large extent not apparent from the distribution shown above because many of the headings include both basic and applied aspects of a given subject. The increase in 1971 in the field "General atomic energy development" is attributable to greater interest in the legal aspects of nuclear technology and in

[10] Ibid. para. 31.

scientific documentation and computer information systems - subjects which are included under this general heading - and reflects the overall growth in atomic energy activities, particularly those involving practical applications. The latter trend probably also explains the decline in the percentage of awards in nuclear physics. It is interesting to note that the awards in 1971 in nuclear physics, constituting 17% of all 1971 awards, include a significant number of fellowships for study at the Trieste Centre, which provides a truly outstanding programme for the benefit of developing countries; in 1971 the Centre's programme emphasized special problems in the areas of elementary particle and solid state physics. A comparison of the fellowships awarded over the period 1969-1971 is as follows:

	1969	1970	1971
Type I awards	110	159	155
Type II awards	146	163	200
Trieste Centre awards	8	6	11
UNDP awards	31	40	29
Total	295	368	395

73. This shows an increase of one third in the total number of awards since 1969. A development of no less significance is the steady and considerable rise in the number of Type II awards, which accounted for more than half of the total awards in 1971. This favourable situation has been brought about by the generosity of Member States and the special efforts made by the Agency to achieve maximum utilization of the training opportunities offered to the Agency on a cost-free basis. In this connection a new, "conditional award" procedure was introduced to offer appropriate Type II training opportunities to those candidates who otherwise could not be selected owing to lack of funds or to the unavailability of cost-free openings in the host country of the candidate's expressed choice. According to this procedure, an award is "conditional" in the sense that it is contingent upon its acceptance by the host and nominating authorities as well as the candidate himself; no alternative training opportunity is made available in the programme year in question. Out of 172 new Type II awards in 1971, 36 were made under the "conditional award" procedure.

74. The Agency could have met more fellowship requests, by means of Type I awards, had it not been necessary to use a sizable share of Type I funds to cover the travel costs of many of its fellows. The basic Agency policy is that the cost of international travel should be borne by the nominating Government, irrespective of whether a Type I or Type II award is involved, except in the case of certain offers of cost-free fellowships which include the payment of travel costs. The Agency has often found it necessary to apply this rule in a flexible manner, but it should be borne in mind that the Agency invariably agrees to meet part or all of the cost of travel in response to a specific request only in exceptional cases based, for example, on hardship grounds owing to stringent foreign exchange regulations, which constitute a recurrent difficulty in a number of nominating countries. It is to be noted, however, that requests of this kind are becoming more and more numerous. The Agency tries to be fair and equitable in the administration of its policy on the payment of international travel costs. It has occasionally come to its attention that fellowship nominating authorities sometimes permit and even encourage an award holder to pay his own international travel costs; as far as the Agency is concerned this has never been necessary to enable a candidate to take advantage of a fellowship award.

75. From among the fellowship nominations it receives, the Agency gives special attention to requests for training associated with Agency-assisted projects, in the belief that integrated technical assistance is more effective. However, such requests do not constitute a large proportion of the fellowship nominations received. This is understandable since the training needs of most nominating countries extend far beyond projects for which the Agency has actually provided or is currently providing assistance in the form of experts or equipment, or both. Nevertheless, the Agency reviews the training needs of those selected for awards closely to ensure that their studies are relevant to home country programmes which are supported and given priority in the Government's development plans.

76. On the other hand, requests continue to be received for formal training with a view to obtaining higher academic degrees in spite of the Agency's policy that awards are not made specifically for degree studies. It has been observed that, over the years, a relatively large proportion of the requests for training leading to advanced degrees, especially the Ph. D. degree, come from the developing countries whose nuclear activities are not yet very advanced. On the other hand, nominees from developing countries engaged in medium-level or advanced nuclear programmes usually are interested in training which is directly applicable to the assignments to which they will return and show little interest in obtaining higher academic degrees. The net result is that those countries most in need of immediate technical assistance of direct use to them tend to request training in basic research which they can ill afford to support at present. There is reason to believe that the academic degree sought is often looked upon as a status symbol without reference to its ultimate value in preparing the candidate for a professional career. It seems apparent that the effectiveness of the fellowship programme could be enhanced if a more searching review of applications were carried out by governmental authorities, through which nominations are submitted, to ensure the compatibility of the requested training with the needs and objectives of the nominating country and its ability to support the work programme of the fellow upon his return.

77. Training objectives which include the obtaining of a degree usually are not fulfilled within one year; hence prolongation of the duration of the fellowship is often requested. For example, 51 extensions (28 of which were under Type II arrangements) of a duration of six months or more were granted in 1971; of this number, 38, or about 10% of total awards, were in respect of studies leading to an academic degree. The Agency carefully screens each request for extension in order to avoid carrying forward a large continuing financial commitment that limits the possibility of making new awards in subsequent programme years. The number of effective awards in 1969-71 has been as follows:

	1969	1970	1971
Nominations received	448	511	519
Effective awards [11]	295	368	395
Percentage of nominations which led to effective awards	65.8%	72.0%	76.1%

78. As can be seen from the above comparison, the numer of nominations received and of awards, as well as the percentage of nominations resulting in effective awards, continued to rise in 1971. In last year's report it was shown that, in 1970, for the first time in the history of the Agency's fellowship programme, the percentage of

[11] Total number of awards less withdrawals after award as at 31 December 1969, 1970 and 1971.

nominations which led to effective awards exceeded 70%: [12] the situation in 1971 was even better. In earlier years the lower ratios between effective awards and nominations resulted from the large proportion of candidates withdrawn by nominating authorities before or after award. Although this situation has improved, the relatively high number of withdrawals - especially after an award has been made and a suitable training programme arranged at a host institution - continues to be a source of concern to the Agency. It is essential that special efforts should be made by nominating countries to restrict withdrawals to cases necessitated by unforeseen circumstances in order to avoid undermining the goodwill of the host institutions and authorities upon which the Agency depends for the arrangement of appropriate training programmes for fellows and to reduce the considerable amount of time and effort lost in processing nominations which are later withdrawn. Closer scrutiny of individual applications and a review by nominating authorities to determine the continued availability of candidates to accept an Agency fellowship, if conducted just before nominations are submitted to the Agency, would considerably reduce the number of withdrawals.

79. An analysis of those nominations which did not lead to effective awards in 1971 reveals that withdrawals did not constitute the major proportion, since they accounted for less than half of such cases, as shown below.

Nominations not resulting in effective awards in 1971

	Number	Share of total nominations received
Not selected because of the candidate's lack of qualifications or experience, or because the requested field of training was not in the Agency's area of competence	57	11%
Withdrawn on the initiative of the nominating Government (before or after award)	52	10%
Not resulting in awards owing to the lack of funds or appropriate training openings	15	3%
Total	124	24%

(b) Evaluation of fellowships

80. In continuation of its routine evaluation procedure the Agency has recently undertaken a survey of the fellowship programme, the third in a series that covers the period from the inception of the programme in 1958 to the end of 1969; this latest survey includes the fellows who completed their training in 1968 and 1969. During these two years 550 fellows from 49 countries finished their training abroad; of these, 380 (or 69%) completed and returned the evaluation questionnaire. Analysis of the information received indicates, as in previous surveys, that a very high percentage of fellows returned to their home countries (95.3% of those who returned the questionnaire) upon the completion of their Agency fellowship. Among those who remained abroad (4.7%), a large proportion did so in order to continue their studies without Agency support (3.1%), while only 1.6% remained abroad because of employment opportunities.

[12] GC(XV)/INF/131, para. 67.

81. In the questionnaires returned, 79.8% of the fellows stated that their current activities were closely related to their training, 18% stated that their present work was partially related and 2.2% that it was unrelated to their training. These replies, in comparison with those received in the preceding survey, show an increase in the proportion of fellows whose training was closely related to their current work. About 96% expressed satisfaction with their training, and only 1.3% considered that their training was inadequate. During 1968 and 1969, approximately 10% of Agency fellows received academic degrees; among these, four out of ten obtained the Ph.D. degree and the balance the M.Sc. degree. Of the fellows surveyed recently, about 15% had technical papers published during their training or soon after returning home. The gratifying results of this latest survey largely correspond with those of earlier surveys carried out to evaluate the effectiveness of the fellowship programme.

82. In last year's report it was indicated that in 1971 the Agency would initiate a survey of the fellows who completed their training during 1959-1963 to establish, in so far as possible, the extent to which their training, together with the experience gained while abroad, has contributed to the development of the industrial, scientific, technological and socio-economic infrastructures, including those related specifically to nuclear energy development and utilization, in their home countries. [13] This survey, intended as an evaluation exercise in depth, will cover approximately 1200 completed fellowships; from it the Agency expects to derive interesting and significant information, which will be included in next year's report.

(c) Short-term training projects

83. Training courses, study tours, scientific visits and other short-term training projects make up the Agency's intercountry programme, which is mainly financed from regular programme and UNDP funds. The Agency recognizes that the degree of effectiveness of such a programme depends to a very great extent on the participating developing countries' specific requirements, resources and their choice of candidates for training. Taking this into account, the Agency has continuously aimed at selecting and executing projects that could be expected to meet the needs of its Member States. It was with this objective in mind that the Agency conducted more than half of its training courses in 1971 in developing countries on subjects of special interest to them. Nuclear power, the use of isotopes and radiation in different aspects of soil and animal science, medicine, industry, and the maintenance and repair of nuclear electronic equipment were some of the main subjects of Agency training courses. [14] It is also to be noted that, in line with a suggestion made by the Governments of developing countries that their trained personnel should be used more extensively for technical assistance assignments, more than one third of the lecturers for the Agency's training courses in 1971 came from those countries.

84. Of continuing importance to the recipient countries are also the Agency's programmes of individual scientific visits, whereby a limited number of senior scientists from developing countries have the opportunity - under the interregional programme - to visit nuclear centres in the developed countries and - under the regional programme - to visit advanced nuclear facilities in countries other than their own in the region in order to study techniques used in their respective fields.

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[13] GC(XV)/INF/131, para. 39.

[14] See Annex II for details.

85. In addition to individual scientific visits, the Agency has also organized a series of "group scientific visits", study tours, which have been well received and supported by Member States. Following the successful conclusion in 1966 of its first large-scale scientific study tour dealing with the industrial application of isotopes and radiation, which was conducted on an experimental basis, the Agency has conducted seven study tours dealing with the following subjects: radiation protection (in 1968); waste management techniques and programmes (in 1969); industrial application of isotopes and radiation (in 1970); the use of isotopes and radiation in agricultural research (in 1970); in vivo radioisotope measurement techniques in medicine (in 1970); the use of isotopes and radiation in agriculture (in 1971); and standardization of radiation dosimetry (in 1971).

86. All countries that are eligible to receive assistance under UNDP are invited to nominate senior scientists to participate in these study tours. This mode of training is especially useful because the technologies demonstrated and the techniques studied generally involve activities which are either still in their infancy or have not yet been introduced into the nuclear work programmes of the developing countries; furthermore, the experience study tour participants gain usually results in an expansion of such activities within the framework of national programmes, for which assistance is often requested from the Agency. In all, 148 scientists from countries in the five regions have taken part in study tours. These groups are accompanied by two Agency staff members, who assist the participants during their tour and prepare the study tour report which is published subsequently by the Agency.

87. In planning the itinerary for a study tour an attempt is made to include a wide variety of nuclear installations, ranging from power reactors and large research establishments to small undertakings, laboratories, hospitals, and agricultural research centres in which radiation sources are used, so that participants may derive the fullest possible benefit. As the organization of each study tour requires a great deal of preparatory work and planning, the Agency is especially grateful to the host countries for making all the detailed arrangements for visits to installations, the accommodation and transport of participants, and interpretation when required. Generous assistance has always been provided at all stages by the atomic energy commission officials of the countries visited.

88. Upon completion of a study tour, the participants prepare individual reports summarizing their impressions and stating how the experience they have gained can be expected to contribute towards the future development of nuclear programmes in their own countries. A review of participants' reports in respect of the eight study tours conducted so far reveals that all expressed deep appreciation of the study programme, of the efforts made by the staff of the countries visited and of the very warm hospitality offered to them everywhere. The participants considered that they had not only gained very valuable knowledge in visiting the many excellent installations involved, but that they had benefited, in particular, from the inspiration derived from the frank and informal discussions with their hosts of many diverse problems and the friendly contacts established with so many experienced scientists. It was acknowledged that the fast pace of some of these tours was tiring at times, and constructive suggestions were made concerning the organization of similar tours in future. It was agreed by all participants that Agency study tours were organized in a professional and business-like manner and were therefore a valuable means of bringing directly to nationals of developing Member States the knowledge and experience accumulated in the more advanced countries.

89. In view of the great interest shown by Member States in having their nationals participate in these study tours and the positive results obtained in the past, it is expected that three such tours will be organized in 1972 on radiological protection, the use of isotopes and radiation in plant breeding and genetics, and the use of isotopes and radiation in entomology respectively.

Part III. CONCLUSIONS

90. The value of the technical assistance programmes which were being implemented by the Agency in 1971 exceeded the $8 million mark for the first time. This continues to reflect the position noted in respect of 1970[15] when the effects of utilizing regular programme resources as "seed money" for larger scale projects financed by UNDP became apparent. To maintain this volume of assistance and thus meet the needs, on the one hand, of recipient Member States which have already embarked on nuclear energy programmes and, on the other, of those Member States just starting to utilize nuclear technology in their development, the target for voluntary contributions to the General Fund for 1972 was raised to $3 million, an increase of 20% over the target figure for 1971; the value of requests for assistance in the form of experts and equipment in respect of 1972 rose, however, by 46% over 1971. Taking into account annual price increases (estimated by UNDP at 6-7%), the decreasing value of money, and the fact that only 80-85% of the target is met, the volume of technical assistance provided out of the Agency's own resources is declining or, at best, remaining stationary. Since the continued availability to the Agency of UNDP funds is largely dependent on the initial utilization of regular programme funds, it would seem appropriate to recognize the need to ensure that the Agency is provided with a stable means of financing the growing volume of technical assistance requested under its regular programme.

91. The present report shows that it is necessary to co-ordinate atomic energy programmes and allied activities in recipient Member States at all stages, including programme planning, project formulation, implementation and follow-up. In some recipient countries, relatively advanced in the use of atomic energy including the installation of nuclear power, an atomic energy authority or commission has a very relevant role to play, ranging from collaboration with the conventional ministries to acting as a licensing authority. However, there is a danger that in some recipient developing Member States, particularly those with purely agricultural economies, such bodies may be unproductive in the sense that they become self-contained entities with little or no contact with the technical services in the country. It is essential that nuclear technology should not be regarded as extraneous to the other technologies used in economic and scientific development in the developing countries and that projects involving the use of nuclear technology should not be carried out in isolation from other national development projects. Nuclear technology is used on an intersectoral basis and should, therefore, be managed and controlled on that basis.

92. The effectiveness of the technical assistance programme described in this report depends on the availability of trained personnel - engineers, economists, chemists, physicists, middle and lower grade laboratory technicians, other technicians, and the necessary supporting staff. As the requisite scientific personnel at the senior level becomes available, the need for the supporting technical staff and facilities increases. Consequently emphasis is placed on the training component of the programme with a view to ensuring and improving the proficiency of technical support staff. Such staff requires a basic knowledge of laboratory techniques and practices, ranging from the handling and storage of chemicals, etc., to skills such as glass blowing. Curricula at training courses designed to provide this knowledge therefore include all those non-nuclear subjects which are required for the efficient functioning of a radioisotope laboratory. Similarly, as facilities expand in universities, hospitals, industrial research institutes and so forth, it becomes essential to provide for the repair and maintenance of instrumentation, including the maintenance of the conventional apparatus required to service the more sophisticated nuclear electronic instruments in central servicing laboratories and institutes. It is expected that more financial resources will be devoted, both by the Agency and UNDP, to this form of technical assistance, particularly as scientific development becomes more dependent upon the newest technologies.

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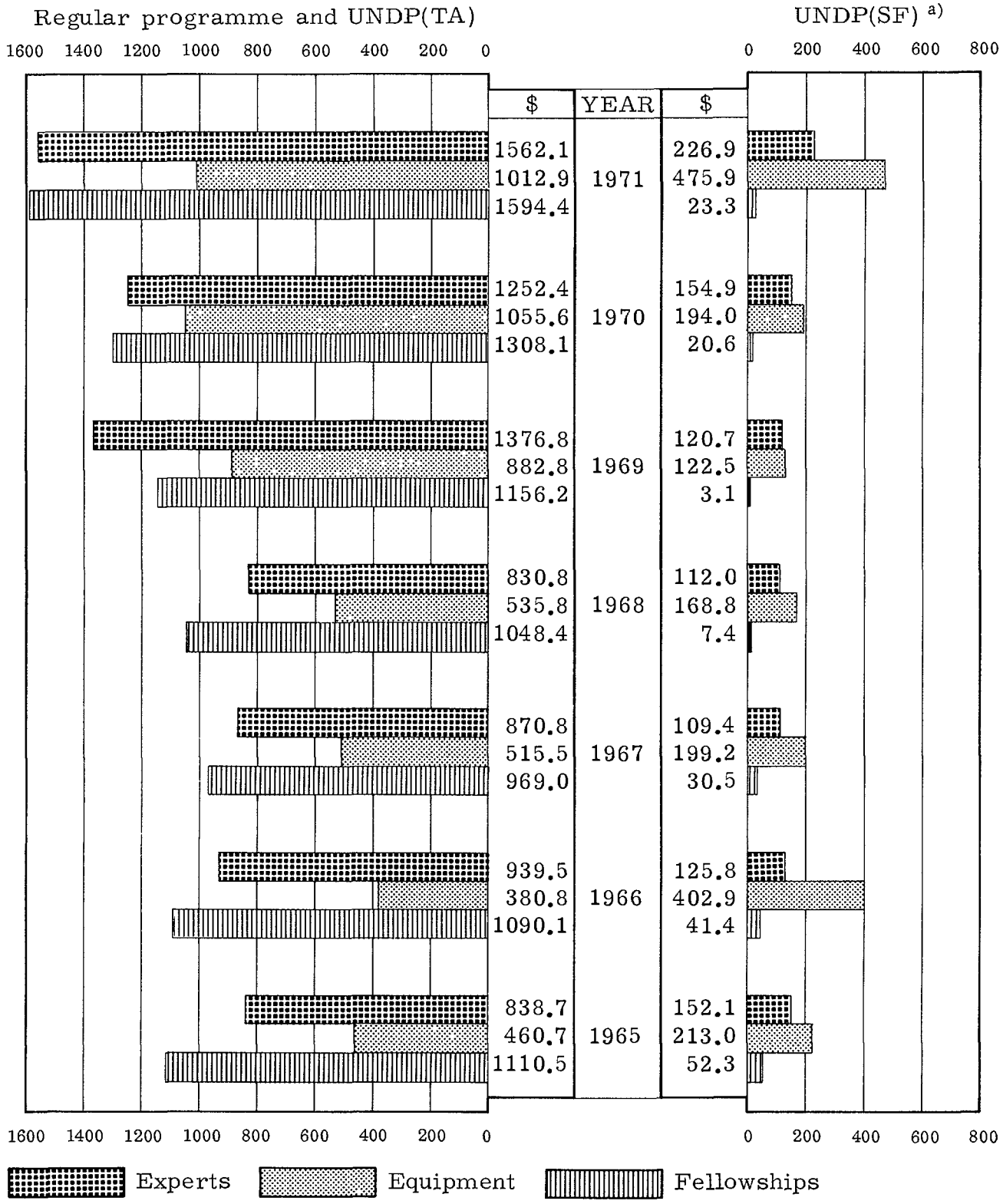
[15] GC(XV)/INF/131, para. 115.

FIGURE 7A

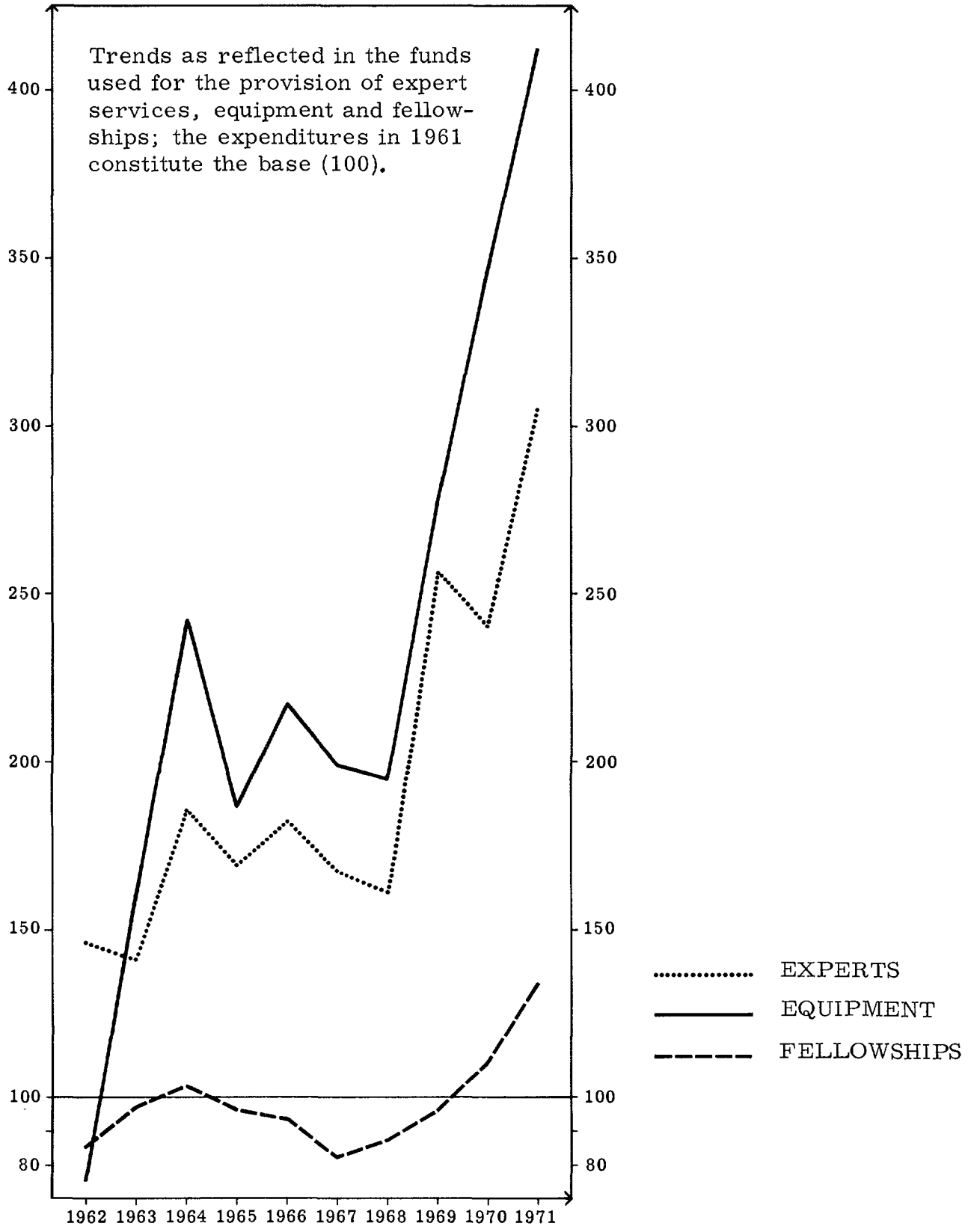
TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY
(in thousands of dollars)



a) The UNDP(SF) figures given above in respect of experts and equipment include expenditures on sub-contracts and miscellaneous project costs; these amounted to $91 600 in 1965, $280 500 in 1966, $129 300 in 1967, $76 200 in 1968, $70 500 in 1969, $1100 in 1970 and $35 100 in 1971.

FIGURE 7B

TRENDS IN THE TECHNICAL CO-OPERATION ACTIVITIES OF THE AGENCY



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

ANNEX I

STATISTICAL TABLES

Introductory Notes

Resources

1. Fig. 1 and Table 1 show only the resources made available for approved field programmes of technical assistance and do not include EPTA-UNDP(TA) or UNSF-UNDP(SF) overhead cost allocations. In addition, data in respect of offers of assistance in kind have been up-dated to 31 December 1971; for example, the value of Type II fellowship offers has been adjusted, where necessary, to reflect the resources that were actually available when fellows took up their studies under Type II arrangements. The estimated value of all offers of assistance in kind in support of a given year's technical assistance programme is shown in columns (2a), (2b) and (2c) of Table 1.

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

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

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

(c) Fellowships. The value of Type II fellowships is estimated on the basis of the monthly stipend rate either as proposed by the host country or as established currently by UNDP, multiplied by the duration of the award in months. The estimated travel costs have been added if they were paid by the host country. (Training course stipends paid under this heading, however, are based on actual payments.)

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

Assistance provided

3. In Tables 4, 5, 7 and 8, the assistance provided by the Agency (experts, equipment and fellowships) includes actual cash payments against 1971 and prior years' obligations, regardless of the time when funds were made available or obligated, plus the total value of assistance in kind, shown according to the year in which it was provided. Thus, the unpaid balance of funds obligated in 1971 is not included in the financial data relating to assistance provided, but is shown separately in column 9 of Table 4; the total cumulative unpaid balance of funds obligated in 1971 and prior years is given at the bottom of this column in Tables 4, 7 and 8.

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

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

Types of assistance

6. (a) Experts. When not shown separately, the assignments of lecturers and visiting professors are included under the heading "Experts". With regard to Table 6, it should be noted that under "Intercountry programmes" the assignments of a number of experts are not sub-divided by region but included, with associated training awards, under the heading "Short-term training projects";

(b) Equipment. As can best be seen in Table 7, the total assistance provided under this heading is the sum of the amounts disbursed for equipment and supplies in respect of country and intercountry programmes and UNDP(SF) projects; and

(c) Fellowships. In Table 3, where awards are classified by place of study, columns relating to short-term regional training projects and scientific visits have been introduced in order to reflect more accurately the valuable contribution made by host countries. The UNDP country, Agency Type I and Type II awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1971 (all notifications of non-acceptances by the proposed host countries and of withdrawals by the nominating countries communicated to the Agency by the close of the year have been taken into account). In Table 6 the number of fellowships classified by nationality does not include awards for short-term training projects and scientific visits, since their inclusion would significantly distort the statistics relating primarily to holders of one-year fellowships. Although awards for short-term training projects and scientific visits are included in Table 6 under "UNDP" and "Agency Type I" (in Table 5 under "Number of fellowships") and are financed under "in kind" arrangements, the regular programme or UNDP, they are not in the same category as Type I, Type II or UNDP country awards. Furthermore, in the financial summaries (Tables 7 and 8) the expenditure on, for example, short-term training projects is not shown as assistance to individual countries but to "Intercountry programmes". It will be noted that the total assistance provided in respect of "Intercountry programmes" in Table 7 corresponds to the relevant total for 1971 under "Short-term training projects" in Table 4. None of the tables includes any reference to local participants in short-term training projects (see Annex II).

Intercountry programmes

7. In the broadest sense, this heading covers expenditure on regional projects for which experts' services only were provided (for example, by regional advisers), regional and interregional projects for which experts, equipment and fellowships were provided (short-term training courses) and regional and interregional projects for which fellowships only were provided (for example, under the training and demonstration programme on advanced atomic energy technology conducted in the region of Asia and the Far East).

UNDP(SF) activities and funds-in-trust arrangements

8. The statistical tables in this year's report include data on Agency-executed UNDP(SF) projects for the first time. They do not, however, include data relating to isotope hydrological services provided by the Agency under sub-contracts to other organizations executing UNDP(SF) projects (see Annex III), or in respect of projects carried out under funds-in-trust arrangements in former years.

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: 1962-1971

(in thousands of dollars)

Year	Monetary			In kind[a/]			Sub-totals		TOTAL
	Agency (1a)	UNDP(SF) (1b)	UNDP(TA) (1c)	Agency (2a)	UNDP(SF) (2b)	UNDP(TA) (2c)	Agency (3)	UNDP (4)	(3) + (4) (5)
1962	1 146	-	828	588	-	-	1 734	828	2 562
1963	1 230	207	954	484	-	-	1 714	1 161	2 875
1964	1 115	469	946	616	-	3	1 731	1 418	3 149
1965	1 200	582	901	502	1	8	1 702	1 492	3 194
1966	1 263	348	893	518	2	-	1 781	1 243	3 024
1967	1 380	438	1 076	562	2	3	1 942	1 519	3 461
1968	1 348	159	1 134	573	-	5	1 921	1 298	3 219
1969	1 587	749	735	650	-	4	2 237	1 488	3 725
1970	1 749	38	1 127	976	6	11	2 725	1 182	3 907
1971	2 214	861	1 132	1 381	-	42	3 595	2 035	5 630
1962-1971	14 232	3 851	9 726	6 850	11	76	21 082	13 664	34 746

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

Table 2

Funds for the Agency's regular programme of technical assistance: 1962-1971

(in thousands of dollars)

Item	1962-1967	1968	1969	1970	1971	1962-1971
Target for voluntary contributions to the General Fund[a/]	12 000	2 000	2 000	2 000	2 500	20 500
Share of target budgeted for technical assistance	10 189	1 793	1 789	1 877	2 437	18 085
Amount pledged	8 231	1 424	1 488	1 673	2 133	14 949
Actually made available for technical assistance[b/]	7 334	1 348	1 587	1 749	2 214	14 232

a/ A share of the funds from voluntary contributions is 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; the additional income to Operating Fund II amounted to $219 500 in 1969, $213 600 in 1970 and $151 800 in 1971, which explains why the amount actually made available for technical assistance in those years exceeds the amount pledged.

Table 3

Experts in the field (classified by nationality) and fellowship awards (classified by place of study): 1971

Country of origin of experts or place of study for holders of fellowship awards	Experts					Fellowship awards						
	UNDP		Agency		TOTAL	UNDP		Agency				TOTAL
	Paid	Free	Paid	Free		Country	Regional	Type I	Type II	Regional	Scientific visits	
Argentina	5[a]	-	2	-	7	-	7	1	6	-	1	15
Australia	7	-	1	-	8	-	-	4	-	1	-	5
Austria	2	-	5	-	7	2	-	2	1	-	2	7
Belgium	3	-	4	-	7	-	-	8	4	-	-	12
Brazil	1	-	1	-	2	-	-	-	2	-	-	2
Bulgaria	-	-	-	-	-	-	-	-	-	-	1	1
Canada	8[a]	2	2	-	12	-	-	4	-	-	3	7
Ceylon	-	-	1	-	1	-	-	-	-	-	-	-
Chile	-	-	1	-	1	-	-	-	-	-	-	-
China	1	-	3	-	4	-	1	-	-	-	-	1
Colombia	-	-	-	-	-	-	9	-	-	-	-	9
CSSR	4	-	2	-	6	-	14	-	3	29[c]	1	47
Denmark	5	-	4	-	9	-	-	1	1	15[c]	3	20
Egypt, A.R.	1	-	5	-	6	-	8	2	-	-	-	10
Finland	-	-	-	-	-	-	-	-	1	-	-	1
France	10[a]	1	8	-	19	2[b]	-	31	10	31	4	78
Germany, F.R.	16[a]	2	10	4	32	3[b]	-	3	35	30	5	76
Ghana	-	-	-	-	-	-	20	-	-	-	-	20
Greece	-	-	1	-	1	-	-	-	-	-	-	-
Hungary	2	-	7	-	9	-	-	-	6	-	-	6
Iceland	1	-	1	-	2	-	-	-	-	-	-	-
India	10	-	3	1	14	1[b]	1	1	11[c]	20	1	35
Indonesia	-	-	-	-	-	-	-	-	-	1	-	1
Iran	1	-	1	-	2	-	-	-	-	-	-	-
Iraq	1	-	-	-	1	-	-	1	-	-	-	1
Israel	1	-	2	-	3	-	-	-	1	-	-	1
Italy	2	-	3	1	6	1[b]	11	-	15	36	2	65
Japan	3	-	3	-	6	-	35	4	7	4	-	50
Kenya	-	-	-	-	-	-	1	-	-	-	-	1
Korea, R.	-	-	-	-	-	-	2	-	-	-	-	2
Kuwait	-	-	-	-	-	-	-	-	-	1	-	1
Luxembourg	-	-	-	-	-	-	-	-	-	1	-	1
Mexico	-	-	1	-	1	-	-	-	2	-	-	2
Netherlands	3	-	3	-	6	1[b]	-	3	6	-	3	13
Nigeria	1	-	-	-	1	-	-	-	-	-	-	-
Norway	1	-	3	1	5	-	-	2	-	-	1	3
Pakistan	2	-	-	-	2	-	1	-	-	-	-	1
Peru	1	-	-	-	1	-	-	-	-	-	-	-
Philippines	1	-	1	-	2	-	14	-	2	1	-	17
Poland	3	-	2	-	5	-	-	-	6	-	-	6
Puerto Rico	-	-	-	-	-	-	-	-	-	-	1	1
Romania	-	-	1	-	1	-	-	-	1	-	1	2
Singapore	-	-	-	-	-	-	15	-	-	-	-	15
Spain	-	-	1	-	1	1[b]	-	-	7	1[c]	2	11
Sweden	8[a]	-	4	-	12	1[b]	-	7	2[c]	15[c]	4	29
Switzerland	-	1	5	-	6	-	-	-	1	-	1	2
Thailand	-	-	-	-	-	-	24	-	-	1	-	25
Turkey	-	-	1	-	1	-	-	-	-	-	-	-
Uganda	-	-	-	-	-	-	-	1	-	-	-	1
UK	23[a]	2	29	-	54	15[b]	-	48	3[c]	31	5	102
USA	23[a]	5	31	2	61	4	-	19	53[c]	51	5	132
USSR	6	-	4	-	10	-	-	-	8	59	1	68
Viet-Nam	1[a]	-	1	-	2	-	-	-	-	-	-	-
Yugoslavia	6[a]	-	3	-	9	2[b]	-	-	3	-	3	8
Sub-total	163	13	160	9	345	33	163	142	197	328	50	913
CERN, Geneva						-	-	1	-	-	-	1
IAEA, Austria						4[b]	-	10	-	3	1	18
Joint Institute for Nuclear Research, Dubna, USSR						-	-	-	3	-	-	3
NPY Reactor Physics Project						-	-	1	-	-	-	1
Pan-American Training Course on Metallurgy, Buenos Aires						-	-	1	-	-	-	1
Peaceful Nuclear Explosions Project, Saclay						-	-	4	-	-	-	4
Trieste Centre						-	-	1	-	-	-	1
Uppsala International Seminar, Sweden						-	-	1	-	-	-	1
Sub-total						4	-	19	3	3	1	30
GRAND TOTAL	163	13	160	9	345	37	163	161	200	331	51	943[d]

a/ Includes the following UNDP(SF)-financed experts, from: Argentina, one, Canada, two; France, one, Federal Republic of Germany, two, Sweden, six; United Kingdom, six; United States, one; Yugoslavia, one.

b/ Includes the following UNDP(SF)-financed awards, in: Federal Republic of Germany, one, India, one; Italy, one; Netherlands, one; Sweden, one; United Kingdom, five; Yugoslavia, two; IAEA, Austria, two.

c/ Includes the following SIDA-financed awards, in: India, one, Sweden, two, United Kingdom, three; United States, one; as well as 15 participants in a training course held in Denmark and Sweden.

d/ The difference between the number of awards (739) and the number of places of study (943) is due to the fact that nine fellows studied in two, one in three and one in four different countries, 29 participants in a study tour went to five countries; 15 fellows participated in a training course held in two countries; nine participants in a demonstration project in Asia and the Far East and the 15 participants in the scientific visit programme went to 32 and 51 places of study respectively.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1962-1971

(in thousands of dollars)

TYPE	Experts		Visiting professors		Equipment		Fellowships		Research fellowships and scientific visits		Short-term training projects		Sub-contracts		TOTAL		Assistance outstanding at 31 December 1971		TOTAL (8)+(9) +(10)
																	Unliquidated obligations	In kind balance[a]	
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	(10)	(11)
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	$	$
1962-1968																			
UNSF-UNDP(SF)	604.0	30.8	-	-	654.9	33.3	153.7	7.8	-	-	-	-	551 7	28 1	1 964.3	100.0	-	-	1 964.3
EPTA-UNDP(TA)	2336.8	41.1	-	-	1247.5	21.9	941.5	16.5	-	-	1167.2	20.5	-	-	5 693.0	100.0	-	-	5 693.0
Agency monetary	2449.6	32.4	648.7	8.6	1424.6	18.9	2 304.0	30.5	140.3	1.9	584.8	7.7	-	-	7 552.0	100.0	52.1	-	7 604.1
Assistance in kind[a]	107.9	2.7	-	-	444.8	11.2	3 384.6	85.4	-	-	25.7	0.7	-	-	3 963.0	100.0	-	15.3	3 978.3
TOTAL	5498.3	28.7	648.7	3.4	3771.8	19.7	6 783.8	35.4	140.3	0.7	1777.7	9.2	551.7	2.9	19 172.3	100.0	52.1	15.3	19 239.7
1969																			
UNDP(SF)	120.7	49.1	-	-	69.0	28.0	3.1	1.2	-	-	-	-	53.5	21.7	246.3	100.0	-	-	246.3
UNDP(TA)	579.2	46.8	-	-	296.7	24.0	132.0	10.6	-	-	230.0	18.6	-	-	1 237.9	100.0	-	-	1 237.9
Agency monetary	578.9	36.7	121.9	7.7	452.8	28.7	336.9	21.3	19.9	1.3	67.3	4.3	-	-	1 577.7	100.0	129.9	-	1 707.6
Assistance in kind[a]	4.3	0.7	-	-	82.0	13.7	503.8	83.9	-	-	10.1	1.7	-	-	600.2	100.0	-	27.2	627.4
TOTAL	1283.1	35.0	121.9	3.3	900.5	24.6	975.8	26.7	19.9	0.5	307.4	8.4	53.5	1.5	3 662.1	100.0	129.9	27.2	3 819.2
1970																			
UNDP(SF)	143.2	39.4	-	-	211.8	58.2	11.2	3.1	-	-	17.7	4.9	(20.3)	(5.6)	363.6	100.0	17.8	-	381.4
UNDP(TA)	465.0	42.1	-	-	305.9	27.7	108.8	9.8	-	-	225.9	20.4	-	-	1 105.6	100.0	-	-	1 105.6
Agency monetary	571.3	35.3	75.9	4.7	409.8	25.3	401.6	24.8	18.9	1.2	141.8	8.7	-	-	1 619.3	100.0	408.2	-	2 027.5
Assistance in kind[a]	20.8	2.3	-	-	300.8	33.5	512.7	57.2	-	-	62.8	7.0	-	-	897.1	100.0	-	123.8	1 020.9
TOTAL	1200.3	30.1	75.9	1.9	1228.3	30.8	1 034.3	26.0	18.9	0.5	448.2	11.2	(20.3)	(0.5)	3 985.6	100.0	426.0	123.8	4 535 4
1971																			
UNDP(SF)	226.9[b]	31.3	-	-	452.6	62.3	23.3	3.2	-	-	-	-	23.3	3.2	726.1	100.0	166.4	-	892.5
UNDP(TA)	519.8	46.7	-	-	213.4	19.2	104.4	9.4	-	-	275.1	24.7	-	-	1 112.7	100.0	416.8	-	1 529.5
Agency monetary	760.1[b]	35.8	60.7	2.9	495.1	23.3	509.0	24.0	26.7	1.2	272.7	12.8	-	-	2 124.3	100.0	1060.4	-	3 184.7
Assistance in kind[a]	27.0	2.9	-	-	204.2	21.9	617.7	66.2	-	-	83.5	9.0	-	-	932.4	100.0	-	725.2	1 657.6
TOTAL	1533.8	31.3	60.7	1.2	1365.3	27.9	1 254.4	25.6	26.7	0.6	631.3	12.9	23.3	0.5	4 895.5	100.0	1643.6	725.2	7 264.3
1962-1971																			
UNSF-UNDP(SF)	1094.8	33.2	-	-	1388.3	42.1	191.3	5.8	-	-	17.7	0.5	608.2	18.4	3 300.3	100.0	184.2	-	3 484.5
EPTA-UNDP(TA)	3900.8	42.6	-	-	2063.5	22.6	1 286.7	14.1	-	-	1898.2	20.7	-	-	9 149.2	100.0	416.8	-	9 566.0
Agency monetary	4359.9	33.9	907.2	7.0	2782.3	21.6	3 551.5	27.6	205.8	1.6	1066.6	8.3	-	-	12 873.3	100.0	1650.6	-	14 523.9
Assistance in kind[a]	160.0	2.5	-	-	1031.8	16.1	5 018.8	78.5	-	-	182.1	2.9	-	-	6 392.7	100.0	-	891.5	7 284.2
GRAND TOTAL	9515.5	30.0	907.2	2.9	7265.9	22.9	10 048.3	31.7	205.8	0.6	3164.6	10.0	608.2	1.9	31 715.5	100.0	2251.6	891.5	34 858.6

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

b/ The 1971 figures for "Experts" include miscellaneous and bank charges amounting to $11 800 under "UNDP(SF)" and $8200 under "Agency monetary".

Table 5

Fields of activity of technical assistance: 1971

Field	Number of expert assignments	Cost of equipment (in thousands of dollars)	Number of fellowship awards[a/]
General atomic energy development	8	27.0	24
Nuclear physics	29	137.3	110
Nuclear chemistry	14	29.9	36
Prospecting, mining and processing of nuclear materials	20	207.2	14
Nuclear engineering and technology	64	78.3	141
Application of isotopes and radiation in agriculture	104	595.6	162
Application of isotopes and radiation in medicine	37	119.4	78
Application of isotopes and radiation in biology	16	64.0	33
Other fields of application of isotopes and radiation	51	128.7	100
Safety in nuclear energy	23	101.4	41
TOTAL	366	1488.8	739

a/ These figures include 340 participants in 23 regional and interregional training projects and 15 holders of awards for scientific visits.

Table 6

Recipients of expert services and fellowship awards: 1971

RECIPIENT	Number of expert assignments, classified by location of duty station										Number of fellowship awards, classified by nationality of recipient							
	UNDP				Agency				TOTAL		UNDP		Agency				TOTAL	
	Paid		Free		Paid		Free						Type I		Type II			
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Country programmes:																		
Albania	-	-	-	-	3	4	-	-	3	4	-	-	-	-	-	-	-	-
Algeria	-	-	-	-	-	-	-	-	-	-	-	-	4	44	-	-	4	44
Argentina	2	2	-	-	5	20	-	-	7	22	-	-	3	25	4	48	7	73
Austria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Bolivia	3	11	-	-	2	7	-	-	5	18	1	6	3	34	1	9	5	49
Brazil	11	37	-	-	6	14	-	-	17	51	1[b]	1	6	72	7	73	14	146
Bulgaria	-	-	-	-	1	1	-	-	1	1	2	17	6[c]	50	7	63	15	130
Burma	-	-	-	-	1	9	-	-	1	9	-	-	1[c]	12	4	26	5	38
Cameroon	1	9	-	-	2	15	-	-	3	24	-	-	1	12	-	-	1	12
Ceylon	-	-	-	-	2	6	-	-	2	6	-	-	1	12	1	9	2	21
Chile	3	5	-	-	2	23	-	-	5	28	-	-	2	9	1	12	3	21
China	1	4	-	-	-	-	-	-	1	4	2	15	3	26	5	49	10	90
Colombia	-	-	-	-	1	2	1	3	2	5	-	-	1	6	2	21	3	27
Costa Rica	-	-	-	-	-	-	-	-	-	-	-	-	1	12	-	-	1	12
Cuba	-	-	-	-	1	7	-	-	1	7	-	-	1	1	-	-	1	1
Cyprus	-	-	-	-	1	4	-	-	1	4	-	-	1	6	-	-	1	6
CSSR	-	-	-	-	-	-	-	-	-	-	-	-	5	48	5	51	10	99
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Egypt, A.R.	1	12	-	-	3	17	-	-	4	29	-	-	6[c]	49	23	247	29	296
El Salvador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Ethiopia	-	-	-	-	-	-	-	-	-	-	-	-	1	10	-	-	1	10
Ghana	-	-	-	-	1	2	-	-	1	2	-	-	1	12	1	12	2	24
Greece	10[a]	29	-	-	7	7	-	-	17	36	2	16	6	56	4	42	12	114
Guatemala	-	-	-	-	4	5	-	-	4	5	-	-	-	-	-	-	-	-
Haiti	-	-	-	-	2	1	-	-	2	1	-	-	-	-	-	-	-	-
Hungary	1	2	-	-	7	7	-	-	8	9	4	19	6	66	8	92	18	177
Iceland	-	-	-	-	1	2	-	-	1	2	-	-	-	-	-	-	-	-
India	25[a]	43	-	-	1	1	-	-	26	44	9[b]	58	8	85	10	108	27	251
Indonesia	-	-	-	-	3	12	-	-	3	12	1	9	1	4	4	42	6	55
Iran	3	17	-	-	1	2	-	-	4	19	-	-	3	36	2	12	5	48
Iraq	3	18	-	-	1	1	-	-	4	19	1	6	6	55	10	102	17	163
Israel	-	-	-	-	4	4	-	-	4	4	-	-	2	15	7	82	9	97
Ivory Coast	1	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Jamaica	-	-	-	-	3	4	-	-	3	4	-	-	-	-	2	15	2	15
Jordan	-	-	-	-	-	-	-	-	-	-	-	-	4	48	-	-	4	48
Kenya	-	-	-	-	1	3	-	-	1	3	-	-	1	3	-	-	1	3
Korea, R.	-	-	-	-	4	18	-	-	4	18	-	-	3	36	10	111	13	147
Kuwait	-	-	-	-	1	3	-	-	1	3	-	-	-	-	-	-	-	-
Lebanon	-	-	-	-	2	7	-	-	2	7	-	-	1	6	-	-	1	6
Liberia	-	-	-	-	1	8	-	-	1	8	-	-	-	-	-	-	-	-
Madagascar	-	-	-	-	2	7	-	-	2	7	-	-	3	24	-	-	3	24
Mexico	3	8	-	-	5	18	-	-	8	26	-	-	3	18	-	-	3	18
Morocco	2	4	-	-	2	6	-	-	4	10	-	-	3	18	1	12	4	30
Nigeria	2	18	-	-	2	12	-	-	4	30	-	-	4	39	2	17	6	56
Pakistan	3[a]	17	-	-	2	16	1	6	6	39	-	-	3	36	2	18	5	54
Panama	-	-	-	-	1	6	-	-	1	6	-	-	-	-	2	24	2	24
Peru	1	2	-	-	3	6	-	-	4	8	-	-	1	6	3	36	4	42
Philippines	1	1	-	-	2	12	-	-	3	13	-	-	3[c]	30	9	90	12	120
Poland	1	1	-	-	-	-	-	-	1	1	1	6	5	58	9	104	15	168
Romania	-	-	-	-	1	3	-	-	1	3	-	-	6	51	15	168	21	219
Senegal	1	3	-	-	-	-	-	-	1	3	-[d]	-	1	12	-	-	1	12
Sierra Leone	1	7	-	-	-	-	-	-	1	7		1	1	6	-	-	1	7
Singapore	-	-	-	-	3	13	-	-	3	13	-	-	1	12	-	-	1	12
Spain	-	-	-	-	-	-	-	-	-	-	-	-	2	18	-	-	2	18
Sudan	-	-	-	-	1	10	-	-	1	10	-	-	-	-	-	-	-	-

RECIPIENT	Number of expert assignments, classified by location of duty station										Number of fellowship awards, classified by nationality of recipient							
	UNDP				Agency				TOTAL		UNDP		Agency				TOTAL	
	Paid		Free		Paid		Free						Type I		Type II			
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Syrian A.R.	-	-	-	-	1	1	-	-	1	1	-	-	5	60	4	44	9	104
Tanzania, U.R.	1	1	-	-	-	-	-	-	1	1	1	6	-	-	-	-	1	6
Thailand	3	15	-	-	3	12	-	-	6	27	-	-	5	61	7	78	12	139
Tunisia	1	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Turkey	6	22	-	-	4	6	-	-	10	28	3	36	7	68	8	86	18	190
Uganda	1	12	-	-	1	3	-	-	2	15	-	-	1	2	1	4	2	6
Uruguay	-	-	-	-	3	12	-	-	3	12	-	-	3	18	2	24	5	42
Venezuela	-	-	-	-	4	11	-	-	4	11	-	-	-	-	1	12	1	12
Viet-Nam	-	-	-	-	4	6	-	-	4	6	-	-	-	-	2	24	2	24
Yugoslavia	5	5	-	-	2	2	-	-	7	7	1	5	4	18	10	120	15	143
Zaire, R.	-	-	-	-	4	31	-	-	4	31	-	-	5	57	1	12	6	69
Zambia	1	12	-	-	1	3	-	-	2	15	-	-	1	9	-	-	1	9
Sub-total	98	319	-	-	125	412	2	9	225	740	29	201	155	1471	200	2135	384	3807
Intercountry programmes:																		
Short-term training projects	76	55	13	3	45	22	7	1	141	81	157	190	168	200	15	20	340	410
Scientific visits	-	-	-	-	-	-	-	-	-	-	-	-	15	20	-	-	15	20
Sub-total	76	55	13	3	45	22	7	1	141	81	157	190	183	220	15	20	355	430
GRAND TOTAL	174	374	13	3	170	434	9	10	366[e/]	821	186	391	338	1691	215	2155	739	4237

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

a/ Includes the following UNDP(SF)-financed experts: four/20 man-months, Greece; thirteen/40 man-months, India; and three/17 man-months, Pakistan.

b/ Includes the following UNDP(SF)-financed awards: one/1 man-month, Brazil; and seven/34 man-months, India.

c/ One award was financed from two sources; as the greater number of man-months was approved under Type II arrangements, the award is shown under "Type II".

d/ One award was financed partly from UNDP(TA) funds and partly under the programme for scientific visits; the award is shown under "scientific visits" as the greater number of man-months was used for this activity.

e/ The difference between the number of assignments (366) and the actual number of experts (345) is due to the fact that each of 17 experts served in two and two in three different countries.

Table 7

Financial summary: 1971

(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1971		TOTAL
					UNDP(TA)		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind[a]/	Monetary	In kind[a]/	TOTAL	Unliquidated obligations	In kind balance[a]/	(8) + (9) + (10)
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Country programmes												
Afghanistan	-	(2.4)	-	(2.4)	-	-	(2.4)	-	(2.4)	-	-	(2.4)
Albania	4.0	17.5	-	21.5	-	-	21.5	-	21.5	3.3	-	24.8
Algeria	-	-	13.6	13.6	-	-	13.6	-	13.6	3.2	-	16.8
Argentina	45.0	-	15.3	60.3	6.7	-	48.3	5.3	60.3	77.8	19.8	157.9
Austria	-	-	1.1	1.1	-	-	-	1.1	1.1	-	3.3	4.4
Bolivia	33.3	24.0	23.8	81.1	33.0	-	32.2	15.9	81.1	16.3	6.2	103.6
Brazil	123.0	58.7	54.7	236.4	140.4	-	55.7	40.3	236.4	67.3	28.3	332.0
Bulgaria	0.5	7.0	52.0	59.5	3.6	-	33.3	22.6	59.5	40.3	13.7	113.5
Burma	18.2	18.7	5.2	42.1	2.9	-	35.5	3.7	42.1	47.1	4.6	93.8
Cameroon	46.0	13.3	4.0	63.3	29.5	-	33.8	-	63.3	48.0	-	111.3
Ceylon	9.7	27.4	8.7	45.8	-	-	23.2	22.6	45.8	28.7	3.3	77.8
Chile	47.8	3.9	26.8	78.5	9.9	-	56.1	12.5	78.5	25.4	4.3	108.2
China	9.9	15.6	51.5	77.0	35.4	-	18.8	22.8	77.0	51.7	26.4	155.1
Colombia	12.9	29.1	3.2	45.2	-	-	11.7	33.5	45.2	14.9	22.9	83.0
Costa Rica	-	-	1.5	1.5	-	-	1.5	-	1.5	2.6	6.5	10.6
Cuba	19.6	2.6	0.4	22.6	-	-	22.6	-	22.6	64.0	6.1	92.7
Cyprus	9.0	13.7	4.1	26.8	2.1	-	24.7	-	26.8	23.6	-	50.4
CSSR	-	-	34.5	34.5	0.2	-	25.2	9.1	34.5	15.2	15.1	64.8
Ecuador	-	-	3.5	3.5	-	-	3.1	0.4	3.5	0.8	1.6	5.9
Egypt, A.R.	41.8	7.6	44.6	94.0	22.5	-	40.8	30.7	94.0	67.1	86.0	247.1
El Salvador	-	-	2.9	2.9	-	-	-	2.9	2.9	0.1	-	3.0
Ethiopia	-	24.3	7.5	31.8	-	-	14.6	17.2	31.8	8.1	-	39.9
Ghana	7.4	40.3	13.5	61.2	29.1	-	25.5	6.6	61.2	29.3	16.6	107.1
Greece	27.7	8.9	46.1	82.7	29.8	-	35.9	17.0	82.7	46.3	13.8	142.8
Guatemala	17.7	-	4.4	22.1	-	-	15.6	6.5	22.1	1.4	-	23.5
Haiti	0.9	-	-	0.9	-	-	0.9	-	0.9	-	-	0.9
Hungary	11.9	55.9	44.0	111.8	36.1	-	58.6	17.1	111.8	66.8	25.0	203.6
Iceland	3.6	-	4.4	8.0	-	-	8.0	-	8.0	-	-	8.0
India	22.3	31.4	78.8	132.5	38.1	3.6	23.0	67.8	132.5	93.2	56.0	281.7
Indonesia	25.2	20.5	24.5	70.2	3.3	-	37.9	29.0	70.2	28.8	17.6	116.6
Iran	42.7	2.7	22.9	68.3	40.9	-	13.8	13.6	68.3	30.1	1.9	100.3
Iraq	34.7	0.9	53.6	89.2	37.0	-	17.4	34.8	89.2	60.1	31.2	180.5
Israel	9.6	25.6	23.2	58.4	-	-	35.8	22.6	58.4	17.9	38.5	114.8
Ivory Coast	1.9	-	-	1.9	1.9	-	-	-	1.9	13.5	-	15.4
Jamaica	9.0	0.1	10.6	19.7	-	-	12.2	7.5	19.7	25.8	-	45.5
Jordan	-	-	0.9	0.9	-	-	0.9	-	0.9	24.0	-	24.9
Kenya	5.5	0.3	1.5	7.3	-	-	7.3	-	7.3	0.2	-	7.5
Korea, R.	34.2	8.5	49.1	91.8	-	-	51.3	40.5	91.8	30.9	53.0	175.7
Kuwait	5.5	-	2.9	8.4	-	-	8.4	-	8.4	0.4	-	8.8
Lebanon	14.5	1.2	18.7	34.4	-	-	29.6	4.8	34.4	23.9	-	58.3
Liberia	18.1	4.2	-	22.3	-	-	18.1	4.2	22.3	12.8	12.4	47.5
Libyan A.R.	0.2	-	-	0.2	-	-	0.2	-	0.2	-	-	0.2
Madagascar	10.3	2.0	4.8	17.1	-	-	17.1	-	17.1	6.7	-	23.8
Malaysia	-	5.6	8.0	13.6	0.2	-	13.4	-	13.6	1.4	-	15.0
Mali	-	11.9	-	11.9	-	-	11.9	-	11.9	5.5	-	17.4
Mexico	53.4	7.6	13.2	74.2	25.9	-	41.3	7.0	74.2	61.9	1.3	137.4
Morocco	21.8	14.3	17.1	53.2	14.3	-	34.0	4.9	53.2	45.3	9.3	107.8
Nigeria	54.0	39.1	17.5	110.6	33.6	-	62.2	14.8	110.6	17.8	2.5	130.9
Pakistan	47.6	35.6	23.0	106.2	-	-	79.8	26.4	106.2	36.5	23.5	166.2
Panama	13.1	3.2	7.5	23.8	-	-	16.3	7.5	23.8	2.4	7.5	33.7
Peru	25.2	26.2	2.3	53.7	14.8	-	33.4	5.5	53.7	5.5	57.5	116.7
Philippines	22.8	57.4	66.8	147.0	26.9	-	55.7	64.4	147.0	43.4	43.0	233.4
Poland	2.1	-	52.7	54.8	3.7	-	23.2	27.9	54.8	38.9	32.2	125.9
Romania	9.2	31.7	35.8	76.7	2.6	-	55.6	18.5	76.7	45.2	58.7	180.6
Senegal	8.6	12.7	0.8	22.1	9.7	-	12.4	-	22.1	4.6	-	26.7

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1971		TOTAL
	Experts	Equipment	Fellowships	TOTAL	UNDP(TA)		Agency		TOTAL	Unliquidated obligations	In kind balance[a]	(8) + (9) + (10)
					Monetary	In kind[a]	Monetary	In kind[a]				
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Sierra Leone	14.2	8.8	4.9	27.9	14.4	-	11.5	2.0	27.9	3.3	5.0	36.2
Singapore	29.0	6.4	2.8	38.2	-	-	38.2	-	38.2	11.2	-	49.4
Spain	-	-	4.4	4.4	-	-	4.4	-	4.4	2.6	-	7.0
Sudan	22.0	12.9	5.9	40.8	-	-	40.8	-	40.8	37.4	-	78.2
Syrian A. R.	0.1	13.2	17.1	30.4	2.8	-	17.2	10.4	30.4	38.0	10.8	79.2
Tanzania, U. R.	4.6	-	1.2	5.8	5.8	-	-	-	5.8	-	-	5.8
Thailand	63.2	12.5	58.5	134.2	46.5	-	58.2	29.5	134.2	80.1	44.4	258.7
Tunisia	2.1	-	1.4	3.5	2.1	-	0.8	0.6	3.5	-	0.5	4.0
Turkey	56.8	19.1	52.2	128.1	56.8	-	42.4	28.9	128.1	28.3	29.3	185.7
Uganda	27.2	14.9	1.9	44.0	22.4	-	20.4	1.2	44.0	8.2	0.2	52.4
Uruguay	23.3	31.5	14.9	69.7	(1.0)	-	61.8	8.9	69.7	99.4	8.1	177.2
Venezuela	20.6	4.2	26.0	50.8	0.7	-	26.1	24.0	50.8	12.7	-	63.5
Viet-Nam	12.1	15.5	5.4	33.0	-	-	14.5	18.5	33.0	30.7	15.0	78.7
Yugoslavia	12.1	56.8	47.6	116.5	28.8	-	55.9	31.8	116.5	27.2	26.6	170.3
Zaire, R.	58.1	1.6	5.0	64.7	-	-	64.7	-	64.7	48.4	2.0	115.1
Zambia	32.6	6.5	1.1	40.2	24.2	-	16.0	-	40.2	40.9	-	81.1
Sub-total	1359.4	912.7	1257.8	3529.9	837.6	3.6	1843.4	845.3	3529.9	1894 4	891.5	6315.8
Intercountry programmes												
Africa	17.9	15.7	27.5	61.1	55.5	-	5.6	-	61.1	7.2	-	68.3
Asia and the Far East	77.9	40.9	61.7	180.5	116.0	29.8	34.7	-	180.5	29.2	-	209.7
Latin America	22.6	22.8	4.8	50.2	47.5	2.7	-	-	50.2	18.5	-	68.7
Interregional projects	76.1	20.8	242.6	339.5	56.1	5.9	232.4	45.1	339.5	118.1	-	457.6
Sub-total	194.5	100.2	336.6	631.3	275.1	38.4	272.7	45.1	631.3	173.0	-	804.3
Miscellaneous	8.2	-	-	8.2	-	-	8.2	-	8.2	-	-	8.2
UNDP(SF) projects												
Brazil	-	-	2.2	2.2	2.2	-	-	-	2.2	-	-	2.2
Greece	42.3	40.7	-	83.0	83.0	-	-	-	83.0	2.6	-	85.6
India	104.0	297.6	21.1	422.7	422.7	-	-	-	422.7	148.2	-	570.9
Pakistan	50.2	134.7	-	184.9	184.9	-	-	-	184.9	33.4	-	218.3
Central America	30.4	2.9	-	33.3	33.3	-	-	-	33.3	-	-	33.3
Sub-total	226.9	475.9	23.3	726.1	726.1	-	-	-	726.1	184.2	-	910.3
GRAND TOTAL	1789.0	1488.8	1617.7	4895.5	1838.8	42.0	2124.3	890.4	4895.5	2251.6	891.5	8038.6

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

Table 8

Financial summary: 1958-1971

(in thousands of dollars)

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1971		TOTAL
					UNDP(TA)		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind[a]	Monetary	In kind[a]	TOTAL	Unliquidated obligations	In kind balance[a]	(8) + (9) + (10)
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Country programmes												
Afghanistan	74.9	76.1	56.2	207.2	70.1	-	84.0	53.1	207.2	-	-	207.2
Albania	4.0	26.8	13.3	44.1	-	-	30.8	13.3	44.1	3.3	-	47.4
Algeria	11.0	-	36.1	47.1	10.3	-	29.8	7.0	47.1	3.2	-	50.3
Argentina	508.9	327.0	459.1	1295.0	464.7	0.6	536.0	293.7	1295.0	77.8	19.8	1392.6
Austria	62.0	13.8	111.9	187.7	-	-	127.1	60.6	187.7	-	3.3	191.0
Bolivia	118.9	131.8	83.0	333.7	113.8	-	173.3	46.6	333.7	16.3	6.2	356.2
Brazil	647.3	358.7	438.8	1444.8	625.6	-	551.9	267.3	1444.8	67.3	28.3	1540.4
Bulgaria	5.4	65.6	297.5	368.5	25.5	-	232.2	110.8	368.5	40.3	13.7	422.5
Burma	328.6	191.6	108.7	628.9	416.2	-	148.8	63.9	628.9	47.1	4.6	680.6
Cameroon	91.1	21.2	5.9	118.2	73.1	-	45.1	-	118.2	48.0	-	166.2
Ceylon	198.2	123.5	44.0	365.7	103.1	-	203.1	59.5	365.7	28.7	3.3	397.7
Chile	267.0	152.6	177.3	596.9	170.0	-	300.9	126.0	596.9	25.4	4.3	626.6
China	229.7	120.1	517.2	867.0	273.2	-	250.6	343.2	867.0	51.7	26.4	945.1
Colombia	181.3	127.6	135.4	444.3	132.0	-	123.3	189.0	444.3	14.9	22.9	482.1
Costa Rica	5.6	10.7	1.5	17.8	-	-	7.1	10.7	17.8	2.6	6.5	26.9
Cuba	47.5	17.9	9.2	74.6	-	-	71.7	2.9	74.6	64.0	6.1	144.7
Cyprus	21.5	33.8	12.6	67.9	23.5	-	43.3	1.1	67.9	23.6	-	91.5
CSSR	-	-	292.0	292.0	0.2	-	195.2	96.6	292.0	15.2	15.1	322.3
Denmark	12.9	-	31.3	44.2	-	-	31.2	13.0	44.2	-	-	44.2
Ecuador	46.3	33.0	66.3	145.6	35.5	-	70.2	39.9	145.6	0.8	1.6	148.0
Egypt, A.R.	284.2	260.6	555.6	1100.4	253.6	0.8	478.9	367.1	1100.4	67.1	86.0	1253.5
El Salvador	41.1	18.8	12.4	72.3	14.1	-	30.1	28.1	72.3	0.1	-	72.4
Ethiopia	14.5	39.4	20.9	74.8	-	-	51.2	23.6	74.8	8.1	-	82.9
Finland	0.5	-	39.4	39.9	1.8	-	7.2	30.9	39.9	-	-	39.9
France	-	-	15.9	15.9	-	-	2.4	13.5	15.9	-	-	15.9
Germany, F.R.	-	1.6	1.4	3.0	-	-	3.0	-	3.0	-	-	3.0
Ghana	239.1	112.0	97.5	448.6	140.8	-	263.6	44.2	448.6	29.3	16.6	494.5
Greece	527.0	99.5	351.5	978.0	356.4	-	385.0	236.6	978.0	46.3	13.8	1038.1
Guatemala	49.0	47.2	31.9	128.1	49.1	-	55.1	23.9	128.1	1.4	-	129.5
Haiti	0.9	-	-	0.9	-	-	0.9	-	0.9	-	-	0.9
Hong Kong	20.0	20.6	-	40.6	-	-	40.6	-	40.6	-	-	40.6
Hungary	46.3	173.4	375.2	594.9	111.7	-	366.2	117.0	594.9	66.8	25.0	686.7
Iceland	29.0	72.1	25.8	126.9	-	-	74.5	52.4	126.9	-	-	126.9
India	77.3	159.1	700.5	936.9	221.2	3.6	240.2	471.9	936.9	93.2	56.0	1086.1
Indonesia	349.6	145.4	569.5	1064.5	217.7	-	410.1	436.7	1064.5	28.8	17.6	1110.9
Iran	489.5	43.6	352.0	885.1	386.0	0.5	287.1	211.5	885.1	30.1	1.9	917.1
Iraq	283.0	74.3	338.0	695.3	219.4	-	273.9	202.0	695.3	60.1	31.2	786.6
Israel	165.2	226.5	127.8	519.5	112.9	-	282.8	123.8	519.5	17.9	38.5	575.9
Italy	9.0	-	160.1	169.1	-	-	95.6	73.5	169.1	-	-	169.1
Ivory Coast	7.9	4.3	2.9	15.1	12.2	-	2.9	-	15.1	13.5	-	28.6
Jamaica	16.5	21.5	15.2	53.2	10.4	-	23.1	19.7	53.2	25.8	-	79.0
Japan	50.1	-	322.3	372.4	49.8	-	129.4	193.2	372.4	-	-	372.4
Jordan	28.1	-	13.3	41.4	39.6	-	1.8	-	41.4	24.0	-	65.4
Kenya	31.9	73.8	9.4	115.1	27.4	-	66.1	21.6	115.1	0.2	-	115.3
Khmer Republic	85.0	29.3	1.7	116.0	39.1	-	69.6	7.3	116.0	-	-	116.0
Korea, R.	261.2	113.0	631.4	1005.6	115.0	-	450.4	440.2	1005.6	30.9	53.0	1089.5
Kuwait	5.5	-	3.9	9.4	-	-	9.4	-	9.4	0.4	-	9.8
Lebanon	83.7	34.4	47.3	165.4	-	-	147.2	18.2	165.4	23.9	-	189.3
Liberia	18.1	4.2	-	22.3	-	-	18.1	4.2	22.3	12.8	12.4	47.5
Libyan A.R.	0.4	-	-	0.4	-	-	0.4	-	0.4	-	-	0.4
Madagascar	16.5	24.3	6.7	47.5	-	-	47.5	-	47.5	6.7	-	54.2
Malaysia	-	5.6	12.3	17.9	1.6	-	16.3	-	17.9	1.4	-	19.3
Mali	2.1	11.9	-	14.0	2.1	-	11.9	-	14.0	5.5	-	19.5
Mexico	398.2	190.4	192.2	780.8	314.1	-	325.8	140.9	780.8	61.9	1.3	844.0
Monaco	-	-	4.2	4.2	-	-	4.2	-	4.2	-	-	4.2
Morocco	142.5	90.9	66.7	300.1	65.1	-	203.7	31.3	300.1	45.3	9.3	354.7
Netherlands	-	-	17.8	17.8	-	-	10.8	7.0	17.8	-	-	17.8
New Zealand	-	-	37.2	37.2	-	-	26.2	11.0	37.2	-	-	37.2
Nicaragua	13.9	7.4	20.1	41.4	-	-	41.4	-	41.4	-	-	41.4
Nigeria	136.5	98.3	49.5	284.3	90.6	-	136.7	57.0	284.3	17.8	2.5	304.6

RECIPIENT	Assistance provided, by type				Assistance provided, by source					Assistance outstanding at 31 December 1971		TOTAL
					UNDP(TA)		Agency					
	Experts	Equipment	Fellowships	TOTAL	Monetary	In kind[a]	Monetary	In kind[a]	TOTAL	Unliquidated obligations	In kind balance[a]	(8) + (9) + (10)
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)
Norway	-	-	9.6	9.6	-	-	5.3	4.3	9.6	-	-	9.6
Pakistan	408.3	259.6	435.1	1103.0	263.9	-	540.2	298.9	1103.0	36.5	23.5	1163.0
Panama	17.2	3.2	7.5	27.9	4.1	-	16.3	7.5	27.9	2.4	7.5	37.8
Paraguay	10.3	4.6	32.1	47.0	-	-	31.3	15.7	47.0	-	-	47.0
Peru	163.4	92.0	41.5	296.9	105.7	-	163.5	27.7	296.9	5.5	57.5	359.9
Philippines	301.6	357.2	648.7	1307.5	399.6	8.9	437.6	461.4	1307.5	43.4	43.0	1393.9
Poland	9.4	156.0	566.4	731.8	163.5	-	382.6	185.7	731.8	38.9	32.2	802.9
Portugal	57.5	45.9	37.7	141.1	-	-	88.9	52.2	141.1	-	-	141.1
Rhodesia	2.2	17.8	7.6	27.6	25.4	-	2.2	-	27.6	-	-	27.6
Romania	35.0	96.6	263.1	394.7	47.6	-	246.4	100.7	394.7	45.2	58.7	498.6
Saudi Arabia	18.8	2.9	10.5	32.2	-	-	25.2	7.0	32.2	-	-	32.2
Senegal	108.8	84.9	11.4	205.1	86.5	0.8	117.8	-	205.1	4.6	-	209.7
Sierra Leone	63.5	8.8	4.9	77.2	39.9	-	35.3	2.0	77.2	3.3	5.0	85.5
Singapore	69.6	35.3	5.7	110.6	-	-	106.9	3.7	110.6	11.2	-	121.8
South Africa	-	-	107.8	107.8	-	-	42.1	65.7	107.8	-	-	107.8
Spain	-	-	58.5	58.5	-	-	35.4	23.1	58.5	2.6	-	61.1
Sudan	112.7	58.9	47.0	218.6	27.7	-	182.8	8.1	218.6	37.4	-	256.0
Sweden	-	-	8.8	8.8	-	-	8.8	-	8.8	-	-	8.8
Switzerland	-	-	12.6	12.6	-	-	5.6	7.0	12.6	-	-	12.6
Syrian A.R.	3.9	18.8	21.6	44.3	16.7	-	17.2	10.4	44.3	38.0	10.8	93.1
Tanzania, U.R.	4.6	-	1.2	5.8	5.8	-	-	-	5.8	-	-	5.8
Thailand	578.9	164.1	669.8	1412.8	472.3	-	572.9	367.6	1412.8	80.1	44.4	1537.3
Tunisia	188.1	87.9	145.9	421.9	141.2	-	244.7	36.0	421.9	-	0.5	422.4
Turkey	523.1	210.8	496.6	1230.5	335.0	-	550.9	344.6	1230.5	28.3	29.3	1288.1
Uganda	121.4	71.7	11.7	204.8	119.5	-	78.4	6.9	204.8	8.2	0.2	213.2
USA	-	-	2.6	2.6	-	-	2.6	-	2.6	-	-	2.6
Uruguay	102.9	132.3	44.1	279.3	75.8	-	154.9	48.6	279.3	99.4	8.1	386.8
Venezuela	122.2	34.9	197.5	354.6	25.9	-	167.9	160.8	354.6	12.7	-	367.3
Viet-Nam	67.2	81.4	88.7	237.3	31.4	-	103.1	102.8	237.3	30.7	15.0	283.0
Yugoslavia	147.6	237.8	670.5	1055.9	412.3	-	426.4	217.2	1055.9	27.2	26.6	1109.7
Zaire, R.	135.7	46.5	30.2	212.4	9.6	-	178.0	24.8	212.4	48.4	2.0	262.8
Zambia	69.8	32.0	1.1	102.9	30.6	-	72.3	-	102.9	40.9	-	143.8
Sub-total	10229.1	6377.1	12824.8	29431.0	8228.5	15.2	13390.4	7796.9	29431.0	1894.4	891.5	32216.9
Intercountry programmes												
Africa	67.2	48.5	39.3	155.0	146.9	2.5	5.6	-	155.0	7.2	-	162.2
Asia and the Far East	278.7	97.8	122.1	498.6	428.2	33.6	36.8	-	498.6	29.2	-	527.8
Europe	21.0	18.6	17.3	56.9	56.9	-	-	-	56.9	-	-	56.9
Latin America	204.2	85.2	115.9	405.3	352.3	14.8	36.6	1.6	405.3	18.5	-	423.8
Middle East	5.8	1.2	5.3	12.3	12.3	-	-	-	12.3	-	-	12.3
Interregional projects	458.5	240.2	1208.4	1907.1	938.8	12.7	844.6	111.0	1907.1	118.1	-	2025.2
Trieste Centre	-	-	210.0	210.0	-	-	210.0	-	210.0	-	-	210.0
Sub-total	1035.4	491.5	1718.3	3245.2	1935.4	63.6	1133.6	112.6	3245.2	173.0	-	3418.2
Miscellaneous	75.5	6.5	-	82.0	22.1	-	59.9	-	82.0	-	-	82.0
United Nations Special Fund - UNDP(SF) projects												
Brazil	-	-	2.2	2.2	2.2	-	-	-	2.2	-	-	2.2
Greece	42.3	40.7	-	83.0	83.0	-	-	-	83.0	2.6	-	85.6
India	263.1	496.3	35.4	794.8	794.8	-	-	-	794.8	148.2	-	943.0
Pakistan	50.2	134.7	-	184.9	184.9	-	-	-	184.9	33.4	-	218.3
Philippines	119.7	149.3	83.1	352.1	350.6	1.5	-	-	352.1	-	-	352.1
Turkey	27.5	284.1	-	311.6	311.6	-	-	-	311.6	-	-	311.6
Yugoslavia	199.3	318.0	70.6	587.9	587.9	-	-	-	587.9	-	-	587.9
Central America	409.3	575.9	9.4	994.6	985.3	9.3	-	-	994.6	-	-	994.6
Sub-total	1111.4	1999.0	200.7	3311.1	3300.3	10.8	-	-	3311.1	184.2	-	3495.3
GRAND TOTAL	12451.4	8874.1	14743.8	36069.3	13486.3	89.6	14583.9	7909.5	36069.3	2251.6	891.5	39212.4

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

ANNEX II

REGIONAL AND INTERREGIONAL PROJECTS: 1971

Title	Place and dates	Source of funds	Participation[1/] (1)	(2)	(3)
Regional training course on general isotope techniques	Cairo, Egypt, A.R. 12 April to 1 May	UNDP(TA)	8	-	3
Interregional training course on radioimmunoassay techniques	Pisa, Italy 3 to 14 May	Regular programme	34	-	6
Regional training course on the application of isotope techniques in hydrology	Bangkok, Thailand 3 May to 11 June	UNDP(TA)	13	-	13
Study tour on standardization of radiation dosimetry	CSSR, France, Germany, F.R. UK, and USSR 6 May to 25 June	Regular programme	29	-	-
Regional training course on radioisotope laboratory techniques	Kwabenya, Ghana 10 May to 27 August	UNDP(TA) and regular programme	20	-	7
Interregional training course on the use of radiation and other mutagen treatments for crop improvement	Lund/Svalöf, Sweden and Risö, Denmark 2 June to 10 July	SIDA and FAO	15	2	-
Interregional training course on the use of radioisotopes and radiation in animal science and veterinary medicine	Fort Collins, Colorado, USA 7 June to 16 July	Regular programme	14	-	2
Interregional training course on the use of radioisotopes and radiation in entomology	Gainesville, Florida, USA 21 June to 13 August	Regular programme	18	-	-
Interregional training course on the use of radiotracer techniques in industry and environmental pollution studies	Raleigh, North Carolina, USA 12 July to 6 August	Regular programme	18	-	-
Study tour on the use of isotopes and radiation in agricultural research	USSR 2 August to 10 September	Regular programme	29	-	-
Interregional training course on the maintenance and repair of nuclear electronic equipment	ILO Centre, Turin, Italy 30 August to 3 December	UNDP(TA)	12	6	-
Regional training course on non-destructive testing (gamma radiography)	Singapore 4 to 29 October	UNDP(TA)	15	1	6
Regional training course on the use of radiation in sterilization and treatment of biomedical products	Buenos Aires and Ezeiza, Argentina 11 October to 19 November	UNDP(TA)	7	-	8
Interregional training course on food irradiation technology and techniques	Bombay, India 1 November to 10 December	Regular programme	19	-	6
Regional training course on radioactive waste management	Tokyo, Japan 4 to 24 November	UNDP(TA)	12	-	-
Regional training course on the application of nuclear techniques in plant biochemistry with reference to protein	Bogota, Colombia 2 November to 3 December	UNDP(TA)	9	-	6
Interregional training course on the preparation and control of radiopharmaceuticals	Prague, CSSR 8 November to 3 December	UNDP(TA)	14	2	6
Advanced regional training course on radiological health and safety measures	Manila, Philippines 15 November to 3 December	UNDP(TA)	13	-	10
Interregional training course on dosimetry for industrial and agricultural radiation processing establishments	Bangkok, Thailand 15 November to 10 December	UNDP(TA)	9	-	10
Regional training course on bid evaluation and implementation of nuclear power projects	Tokyo, Japan 29 November to 10 December	UNDP(TA)	21	1	-
Demonstration project on the use of radiation for the preservation of local food products	Asia and the Far East 1971	Regular programme	1	-	-
Research and demonstration project on isotopes in animal parasitology	Kabete, near Nairobi, Kenya 1971	UNDP(TA)	1	-	11
Survey and control of the Mediterranean fruit fly in Nicaragua and economic assessment of the present and potential damage	Central America 1971	UNDP(SF) and UNDP(TA)	-	-	-
Training and demonstration programme on advanced atomic energy technology	Asia and the Far East 1971	UNDP(TA) and regular programme	9	-	32

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

ANNEX III

IAEA ISOTOPE HYDROLOGICAL SERVICES: UNDP(SF) SUB-CONTRACTS IN 1971[1/]

Country or region and project number	Title	Cost of services provided
Algeria ALG-9	Natural resource surveys, agricultural experimentation and demonstration in the Hodna Region, Central Algeria (FAO)	$ 2 650
Jamaica JAM-12	Development and management of water resources (FAO)	3 800
Morocco MOR-17	Hydro-agricultural development of the Souss Valley (FAO)	3 860
Surinam NET-4	Public water supplies and sewerage (United Nations)	1 270
Tunisia TUN-28	Intensification of ground-water exploitation in Northern and Central Tunisia (United Nations)	3 570
Africa Regional REG-79	Survey of the water resources of the Chad Basin for development purposes (FAO)	4 960
Africa Regional REG-100	Survey of ground-water resources in the Northern Sahara (UNESCO)	2 770
		$22 880

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

ANNEX IV

EXPERTS' FINAL REPORTS[1/]

Reference number	Name of expert	Subject	Country of assignment
580	J. Tupy	Utilization of radioisotopes in agriculture[2/]	Khmer Republic
581	R. Vestergaard	Nuclear engineering	Pakistan
582	J. Brewbaker	Plant breeding	Philippines
583	J.R. McHenry	Radioisotopes in hydrology	Indonesia
584	S. Jovanović	Nuclear instrumentation	Ceylon
585	P. Moser	Nuclear metallurgy	Argentina
586	J. Balcar	Radioisotopes in agriculture	Uruguay
587	T. Sonnino	Nuclear spectroscopy and Mössbauer effect	Brazil
588	L. de Galan	Emission spectroscopy	Argentina
589	Z. Kosina	Nuclear electronics	Iraq
590	Y. Cohen	Radioisotope production	Greece
591	G. von Ehrenstein	Plant genetics	Yugoslavia
592	T.S. Veninga	Radiobiology	Yugoslavia
593	J. Ackermann	Thermodynamics	India
594	N.G. Gopal	Radioisotope production	Indonesia
595	G. Michon	Radiation protection legislation[2/]	Morocco
596	U. Zimmermann	Use of isotope techniques in hydrology within Lake Kainji	Nigeria
597	K. Gussgard	Radiation protection	Zambia
598	K.E. Collins	Low-temperature irradiation facility	China
602	A. McReynolds	Liquid structure by neutron spectroscopy (Part I)	Mexico
603	P. Charles	Radiobiology[2/]	Romania
604	F. Cope	Radioisotopes in agriculture	Chile
606 Rev. 1	A.K. Perkons	Activation analysis	Ceylon
608	J. Shah	Food preservation	Indonesia
609	M.R.R. Rao	Food preservation	Viet-Nam
610	D. Brune	Activation analysis[3/]	Colombia

1/ The reports are available in English unless otherwise indicated. No data have been included in respect of reports whose distribution is restricted to the recipient Government.

2/ Available in French only.

3/ Available in Spanish only.

Reference number	Name of expert	Subject	Country of assignment
611	L. Mellado B.	Application of nuclear techniques in food and agriculture[3/]	Peru
612	B. Balla	Radioisotopes in industry	Iraq
613	A. L. Coco	Aerial prospection for uranium[3/]	Peru
614	R. S. Yalow	Radioisotopes in medicine	Brazil
615	P. Amardeil	Radiation protection[3/]	Mexico
616	T. Braun	Radiochemistry[3/]	Peru
617	C. Desandre-Navarre	Reactor utilization	Iran
619	J. Webb	Atomic energy planning	Tanzania, U. R.
620	M. Tubis	Nuclear medicine	Thailand
621	J. J. Touya	Radioisotopes in medicine[3/]	El Salvador
622	G. W. C. Tait	Health physics[3/]	Nicaragua
624	R. G. Deshpand	Radioisotope production	Indonesia
625	I. R. Ashton	Nuclear instrumentation	Burma
626	J. Kivel	Use of radioisotopes in industry	Korea, R.
627	L. C. Burnelet	Application of radiation in agriculture[2/]	Madagascar
628	W. Parker	Radioisotope production and radiochemistry	Venezuela
629	J. Shepherd	Prospection of nuclear raw materials[2/]	Morocco
631	A. Fornés-Sanchez	Fabrication of fuel elements[3/]	Mexico
632	J. E. Whitley	Radiochemistry	Ghana
633	J. Gagnaire	Application of radioisotopes in agriculture[2/]	Morocco
635	R. W. Thiele	Nuclear chemistry	Burma
637	D. Hillel	Research in soil and water use efficiency	Cyprus
638	E. S. Josephson	Food preservation by ionizing radiation	Iran
640	G. W. C. Tait	Radiation protection	Uganda
641	V. K. Iya	Radioisotope production	Argentina
642	M. de Proost and P. Vose	Application of isotopes and radiation in food and agriculture	Jamaica
643	E. Piesch	Radiation protection[3/]	Mexico
644	D. E. Hull	Industrial applications of radioisotopes	Colombia
645	M. de Proost and P. Vose	Application of isotopes and radiation in agriculture[3/]	Guatemala

Reference number	Name of expert	Subject	Country of assignment
646	A. V. Kardashev	Food preservation	India
647	T. Kawai	Plant breeding	Thailand
648	M. de Proost and P. Vose	Application of radioisotopes and radiation in food and agriculture[2/]	Haiti
650	W. Graban	Radioisotopes in medicine	Kuwait
651	C. Sonntag	Radioisotopes in hydrology	Iran
652	P. Pereau-Leroy	Radioisotopes in agriculture	Israel
653	R. P. Gardner	Radioisotopes in industry	Brazil
654	R. M. Smillie	Plant physiology	Yugoslavia
655	J. A. Ticheler	Radioentomology and control of insects[2/]	Madagascar
656	R. V. Simitsyne	The installation and utilization of radiological equipment[2/]	Morocco
657	R. W. Disney	Radioisotope techniques in entomology	Kenya
658	B. N. C. Agu	Nuclear physics	Sierra Leone
660	K. Vas	Perspectives of food irradiation	Iraq
661	H. Gacitua	Effects of low doses of radiation	Hungary
662	O. Roivainen	Use of radioisotopes in entomology	Ghana
663	H. Wenzl and K. Böning	Radiation damage group	Greece
664	M. P. Moser	Radiation damage	Greece
665	W. T. Binnerts	Radioactivity techniques in the animal sciences	Lebanon
666	T. W. Grunewald	Dosimetry and food irradiation	Chile
667	W. Bock-Werthmann	Raw materials analysis	Colombia
668	J. W. King	Prospection of nuclear raw materials[3/]	Guatemala
669	H. W. J. Bowen	Activation analysis	Indonesia
670	L. Rakoczi	Radioisotopes in hydrology	Thailand
671	K. Svoboda	Radiochemistry	Ceylon
672	E. H. Belcher	Medical physics	Argentina
673	W. R. Brown	Nuclear moisture and density gauges	Turkey
675	G. von Ehrenstein	Mutation breeding	Yugoslavia
676	H. de Choudens	Atomic energy planning[2/]	Tunisia
677	K. Kyrs	Applied nuclear chemistry	Turkey

Reference number	Name of expert	Subject	Country of assignment
678	K.E. Collins	Hot atom chemistry	Philippines
679	W. R. Nelp	Nuclear medicine	Romania
680	C. A. Parera	Prospection and evaluation of nuclear raw materials[3/]	Bolivia
681	M. Paz	Mössbauer spectroscopy	Greece
682	R. M. Felder	Industrial applications of radio-isotopes	Brazil
683	G. Vogl	Radiation damage group	Greece
684	J. Moustgaard	Protein metabolism in farm animals	Yugoslavia
685	T. Hermelin	Radioisotopes in agriculture	Lebanon
686	N. van de Voorde	Radioactive waste management	Poland
687	A. L. Robillard	Ceramic fuel elements technology[2/]	Brazil
688	I. Niculescu Duvaz	Radiobiology	Uruguay
689	J. Kovacs	Food irradiation	Mexico
690	J. W. B. Stewart	Use of radioisotopes in agriculture	Philippines
692	H. U. Schaedel	Nuclear medicine	Bolivia