

International Atomic Energy Agency

THE PROVISION  
OF TECHNICAL ASSISTANCE  
BY THE AGENCY  
WITH SPECIAL REFERENCE  
TO 1968

Report by the Director General

GC (XIII)/INF/111

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## CONTENTS

	<u>Paragraphs</u>
Part I. · INTRODUCTION	1 - 16
A.    Technical co-operation activities in which Governments have shown special interest	8 - 11
B.    Other developments	12 - 16
Part II. ANALYSIS OF THE ASSISTANCE PROVIDED	17 - 87
A.    Available resources	17 - 25
1.    General	17
2.    UNDP(TA)	18
3.    Agency's regular programme	19
4.    Gifts in kind	20 - 21
5.    Other available resources	22 - 23
6.    Use of resources	24 - 25
B.    Distribution of assistance	26 - 42
1.    Fields of activity	26
2.    Geographical distribution of assistance	27 - 28
(a)    Distribution by region	27
(b)    Distribution by country	28
3.    Types of assistance	29 - 42
(a)    Experts and visiting professors	30
(b)    Equipment	31 - 32
(c)    Fellowships	33 - 34
(d)    Regional and inter-regional activities	35 - 42
(i)    Regional advisers	35
(ii)   Short-term training projects	36 - 37
(iii)  Middle Eastern Regional Radioisotope Centre for the Arab Countries	38 - 41
(iv)  Follow-up missions	42
C.    UNDP(SF) activities	43 - 45

	<u>Paragraphs</u>
D. Evaluation of the technical assistance programme	46 - 87
1. General	46 - 61
2. Evaluation of Agency programmes and projects	62 - 87
(a) Soil science	62 - 65
(b) Entomology and insecticide residues	66 - 69
(c) Food preservation	70 - 72
(d) Nuclear raw materials and use of nuclear instrumentation in prospection and analysis	73 - 78
(i) Nuclear raw materials	73 - 75
(ii) Nuclear instrumentation in prospection and analysis	76 - 78
(e) Nuclear power	79 - 84
(f) Fellowships	85 - 87
 Part III. CONCLUSIONS	 88 - 91

## ANNEXES

I	STATISTICAL TABLES
	Introductory Notes
A.	TECHNICAL ASSISTANCE RESOURCES
1.	Available resources: 1959-1968
2.	Agency funds for technical assistance: 1959-1968
3.	Experts in the field, classified by nationality, and fellowship awards, classified by place of study: 1968
B.	DISTRIBUTION OF TECHNICAL ASSISTANCE
4.	Types of technical assistance: 1959-1968
5.	Fields of activity of technical assistance: 1968
6.	Recipients of experts and fellowship awards: 1968
7.	Financial summary: 1968
8.	Financial summary: 1958-1968
II	REGIONAL AND INTER-REGIONAL PROJECTS: 1968
A.	UNDP(TA)
B.	Agency's regular programme
III	IAEA HYDROLOGICAL SERVICES: SUB-CONTRACTS IN 1968

List of abbreviations

Agency	International Atomic Energy Agency
ECAFE	United Nations Economic Commission for Asia and the Far East
ECOSOC	Economic and Social Council of the United Nations
ENEA	European Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
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
IPA	Regional Joint Training and Research Programme using a Neutron Crystal Spectrometer between the Governments of India and the Philippines and the Agency
IUPAC	International Union of Pure and Applied Chemistry
NORA	Joint Agency-Norwegian Programme of Research with the Zero Power Reactor "NORA"
NPY	Co-operative Programme for Research in Reactor Physics between the Governments of Norway, Poland and Yugoslavia
SGAE/ENEA/IAEA	Co-operative programme of Research in the Irradiation of Fruit and Fruit Juices between the Österreichische Studiengesellschaft für Atomenergie (Austrian Atomic Energy Research Organization), the European Nuclear Energy Agency and the International Atomic Energy Agency
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
WHO	World Health Organization
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Congo, D. R.	Democratic Republic of the Congo
CSSR	Czechoslovak Socialist Republic
Germany, F. R.	Federal Republic of Germany
Korea, R.	Republic of Korea
UAR	United Arab Republic
UK	United Kingdom of Great Britain and Northern Ireland
USA	United States of America
USSR	Union of Soviet Socialist Republics

## NOTES

All sums of money are expressed in United States dollars.

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

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

## Part I. INTRODUCTION

1. Following its usual practice, the Board of Governors has requested the communication to the General Conference of the material it used in reviewing the provision of technical assistance by the Agency, with special reference to 1968; this material is accordingly reproduced in the present document. The review was carried out pursuant to paragraph 20 of the Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the Agency [ 1 ].

2. The use of the resources placed at the Agency's disposal, in the form of voluntary contributions, gifts in kind and UNDP(TA) funds, for the provision of technical assistance is reviewed in this document and, in Part II, section C, information is given with regard to the UNDP(SF) projects for which the Agency served either as executing agency or as subcontractor in 1968 (see also 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 1968, 67 countries received technical assistance in one form or another from the Agency, as shown in Table 7 [ 2 ]. Approximately 62% of all assistance provided related to nuclear engineering and technology, the application of isotopes and radiation in agriculture and in medicine, and nuclear physics.

5. The assistance, including grants of equipment and assistance in kind, was provided through the services of 185 experts or visiting professors, the supply of equipment to a value of about \$528 600, and 456 fellowship awards for individual studies, scientific visits, a study tour and training courses.

6. The resources allocated for carrying out the Agency's 1968 technical assistance programme amounted to \$3 096 000 (Table 1), whereas the total value of the technical assistance actually provided in 1968 was about \$2 400 000 (Table 7). This includes payments against 1968 and prior years' obligations, as well as assistance in kind, and represents an increase of 2% over the sum of \$ 2 355 000 provided in 1967 (Table 4), but does not include the unliquidated obligations and assistance in kind outstanding at the end of the year.

7. As in earlier reports on the provision of technical assistance by the Agency [ 3 ], details are given below regarding some of the technical assistance activities in which Member States have shown special interest in 1968, followed by information concerning other developments relating to technical assistance.

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

[ 2 ] All the statistical tables are given in Annex I to this document.

[ 3 ] See for example, document GC(XII)/INF/100.

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

8. As stated in paragraph 4 above and paragraph 26 below, the fields of activity for which most of the assistance was provided in 1968 were nuclear engineering and technology, the application of isotopes and radiation in agriculture and in medicine, and nuclear physics. This was also the case in 1966 and 1967. A good balance has been achieved between theoretical work in nuclear physics, for example, and technological development - both of which make an important contribution to practical research - and agriculture and medicine, where the application of isotopes and radiation accounted for 30% of all the technical assistance provided in 1968. Concerted action by engineers, scientists and technicians in these related activities contributes to the solution of important problems in the developing countries.

9. With regard to nuclear engineering and technology, most of the requests for assistance recently received related to nuclear instrumentation and electronics, followed by requests for projects involving the production of isotopes. In agriculture, most interest was shown in soil fertility, irrigation and crop production, and over 40% of the agricultural expert posts available were for those activities, with a lesser number for food preservation and entomology. In medicine, most of the projects related to the uses of isotopes and radiation in diagnostics and clinical research. Although there was a slight decline between 1966 and 1968 in the monetary value of technical assistance provided in nuclear physics, many requests for assistance for projects in neutron and nuclear physics are still received.

10. Numerous requests were received for experts in radiochemistry and nuclear chemistry (including hot-atom chemistry and the application of tracers in chemistry), together with an appreciable number of requests in respect of projects involving the industrial application of isotopes and radiation and their application in hydrology.

11. An analysis of the requests for experts' services approved in respect of 1968 and earlier years revealed that in the case of more than five out of every eight projects, equipment was also to be provided. This is not surprising in view of the rapid developments in atomic energy technology.

B. Other developments

12. The protracted delay involved in trying to secure the acceptance by Governments of the experts available continues to be a major difficulty in implementing a number of projects. Some Governments, when informed that the world-famous specialist they had requested is not available, tend to turn down other experts who are less well known. Since the expert's qualifications and experience should be the primary consideration, this is unfair, especially to experts from developing countries who can only make a name for themselves when they are given the opportunity of demonstrating their ability. The continued support of Governments, firms and universities in providing qualified experts is essential, it being assumed that they can return to their posts in their home countries on completion of their assignments.

13. In an effort to expedite the placement of fellowship candidates, all fellowship nominations which were received by 30 June 1968 for the 1969 programme were reviewed before the end of the year by selection panels and, where possible, action to secure placement was initiated. The review of nominations received by 30 June in a given year before the end of that year makes it possible for fellowships to be taken up not later than in October of the following year, and it is proposed to continue this practice in future.



14. The close co-operation between the Agency and UNESCO mentioned in paragraph 45 of last year's report [ 3 ], was intensified in 1968 when a panel of experts on nuclear science teaching was jointly held by the two organizations from 15-23 July in Bangkok. The purpose of the meeting was to review the present status of and need for teaching topics related to nuclear science at the secondary and early university level, including teacher training, and to suggest appropriate means by which these topics might be introduced into the science curricula. [ 4 ]

15. Up to 1968, each organization participating in the UNDP(TA) programme received a lump sum allocation for regional projects which was calculated on the basis of its percentage share in the total approved country programmes during the preceding biennial period. The funds made available for this purpose have amounted to about one sixth of the total funds at the disposal of UNDP(TA) for field programmes. At its sixth session in June 1968, however, the UNDP Governing Council decided that for the operational year 1970 and thereafter "Agency target figures" for regional projects would be eliminated and that funds would be allocated on a project-by-project basis after the project proposals had been approved by the Administrator (as in the case of country programme requests) or, when the project has a cumulative value of \$200 000 or more, by the Governing Council. In subsequent discussions with the participating organizations it was found that this would give rise to a number of financial and management problems of a statutory character and, on the recommendation of the Administrator, the Council agreed at its seventh session to postpone the introduction of the new arrangements until 1971.

16. The practical effect of these arrangements for the Agency is that it will no longer be possible, as at present, to develop a programme of regional and inter-regional projects in advance with the assurance that UNDP(TA) funds will be available to carry it out. Project proposals will have to be prepared and submitted individually to the Administrator, and it will not be possible to know in advance which, or how many, of the proposals will be approved. In selecting projects for approval, the Administrator is required:

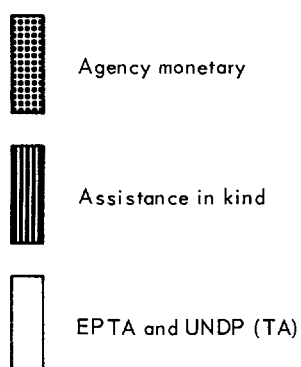
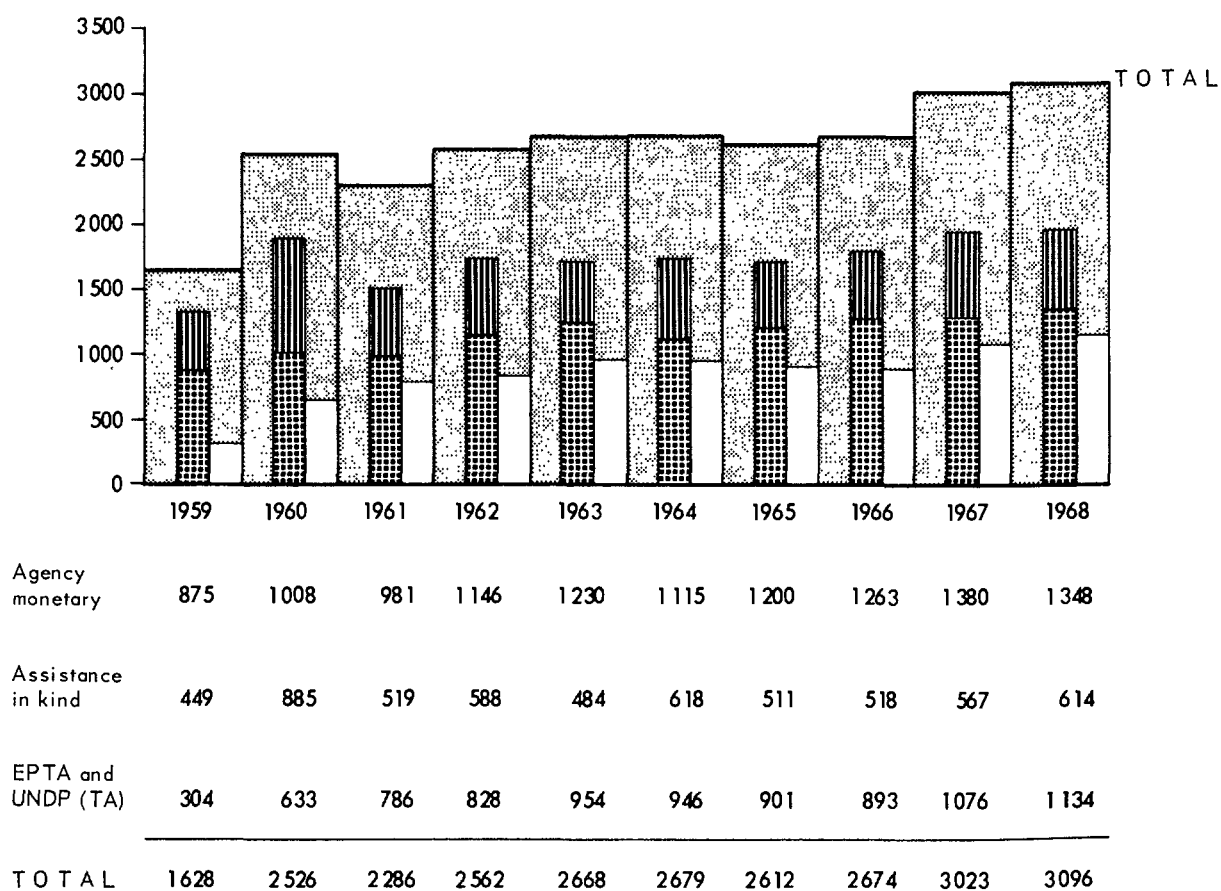
- (a) To assess the relevance of the project to the needs of the region concerned;
- (b) To maintain a balanced distribution of funds between the various regions; and
- (c) To ensure that the maximum use is made of all available currencies.

Clearly, the more support the Agency receives from Governments for each project proposal, the better will be its chance of approval.

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[ 4 ] For additional information, see Nuclear Science Teaching, Technical Reports Series No. 94.

**FIGURE 1**  
**RESOURCES AVAILABLE FOR THE AGENCY'S TECHNICAL ASSISTANCE PROGRAMME (1959-1968)**  
 (in thousands of dollars)



## Part II. ANALYSIS OF THE ASSISTANCE PROVIDED

### A. Available resources

#### 1. General

17. The resources available to the Agency in 1968 for the provision of technical assistance came to \$3 096 000 (see Fig.1 and Table 1), which represents an increase of about 2% over the figure for 1967 (\$3 023 000) and is made up as follows:

- (a) UNDP(TA), \$1 134 000 in cash;
- (b) Income to Operating Fund II, including voluntary contributions of Member States transferred from the General Fund, \$1 348 000 in cash; and
- (c) Gifts in kind (services of cost-free and partly cost-free experts, Type II fellowships and grants of equipment in support of approved technical assistance projects) valued at \$614 000. Of this total, \$609 000 was made available in respect of the regular programme and some \$5000 for UNDP(TA) projects.

#### 2. UNDP(TA)

18. The funds allocated for carrying out the 1968 UNDP(TA) field programme included \$245 000 for regional and inter-regional projects; the balance was allocated for country programme projects. Although the total UNDP(TA) resources allocated in 1968 were approximately 5% higher than in 1967 and were more than in any previous year, they still constituted less than 37% of the total resources available for 1968.

#### 3. Agency's regular programme

19. As at 31 December 1968, the pledges of voluntary contributions to the General Fund for 1968 had only reached 68% of the target figure of \$2 million, as compared with 72% for 1967. Of the target figure, 94% was budgeted for technical assistance. The reduction in the financial support provided by Member States was reflected in the income to Operating Fund II (\$1 348 000, as compared with \$1 380 000 in 1967), from which the regular programme is financed.

#### 4. Gifts in kind

20. The estimated value of assistance in kind in 1968 was about \$614 000, which is 8% higher than the figure of about \$567 000 available for 1967. This rise is attributable to increases in the value of cost-free experts' services (from \$4900 to \$5400), equipment grants (from \$60 000 to \$73 900) and Type II fellowships (from \$502 000 to \$528 900).

21. As indicated in paragraph 3 in the introductory notes to Annex I, the financial data on Type II fellowship offers were adjusted as of 31 December 1968. For 1967 the total value of Type II fellowship awards was estimated at \$538 500. It has proved necessary, however, to reduce this estimate to \$502 000, as Type II fellowship offers valued at \$36 500 - which were not transferable to the next programme year - could not be made use of within the prescribed time limits: in some cases, a candidate who was awarded a Type II fellowship was turned down by the proposed host country; in other cases, where such a candidate was accepted by the proposed host country, he was either no longer available or not interested

in training at the proposed institute. In all such cases the Agency was informed too late to be able to propose another candidate. This situation could be improved significantly if Governments which have not already done so would extend the period during which Type II fellowship offers were valid. In addition, both host and nominating Governments could assist in improving the efficiency of the fellowship programme by replying more quickly to Agency proposals on the placement of fellows.

5. Other available resources

22. In 1968 the Agency received allocations of \$1 564 650 for field projects financed by UNDP(SF).

23. Under funds-in-trust arrangements the Agency carried out three projects in 1968, which involved cash expenditures of \$9400, \$5700 and \$8200 respectively for experts' services and equipment.

6. Use of resources

24. For 1968, the final year in the last biennial period prior to the introduction of continuous programming, [ 5 ] UNDP(TA) expenditures and unliquidated obligations amounted to \$1 836 700, or 20% above the figure of \$1 529 800 in 1964, which had been the highest total up to 1968. This sum was made up of \$1 617 000, i. e. the total UNDP(TA) funds obligated in 1968 (\$665 100 of total UNDP(TA) funds obligated in 1968 had been disbursed and the balance, \$951 900, was carried forward as unliquidated obligations in respect of 1968 on 31 December 1968), and \$219 700 in expenditures resulting from the liquidation of commitments incurred prior to 1968. As indicated at the bottom of column (9) in Table 4, the total UNDP(TA) unliquidated obligations at 31 December 1968 amounted to \$1 003 100, of which \$450 000 was for experts' services, \$348 500 for equipment and \$204 600 for fellowships. The corresponding figures for the regular programme in respect of 1968 and prior years (see "Agency monetary" at the bottom of column (9) in Table 4) are \$871 300, \$303 700, \$246 400 and \$321 200 respectively.

25. Regular programme expenditures of \$953 000 and unliquidated obligations of \$606 000 in 1968 exceeded the cash income to Operating Fund II during that year; likewise, UNDP(TA) expenditures of \$884 800 together with unliquidated obligations of \$951 900 are higher than the total funds made available for 1968 projects. The reason is that the figures for the regular programme and UNDP(TA) include the funds carried over from 1967 and prior years.

B. Distribution of assistance

1. Fields of activity

26. As in 1966 and 1967, the fields of activity for which most of the assistance was provided in 1968 were nuclear engineering and technology, the application of isotopes and radiation in agriculture and in medicine, and nuclear physics. The comparative importance of these four activities in 1967 and 1968 is shown below. Numerical data for all ten fields of activity of technical assistance are given in Table 5 and Fig. 2, which also gives such data in respect of 1967.

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[ 5 ] GC(XII)/INF/100, paras 28-41.

Assistance by field of activity and element: 1967 and 1968  
(in thousands of dollars)

Field	Year	Experts	Equipment	Fellowships	Share of total programme	
		\$	\$	\$	\$	%
Nuclear engineering and technology	1967	163.8	57.3	247.4	468.5	19.9
	1968	153.8	50.3	272.4	476.5	19.9
Application of isotopes and radiation in agriculture	1967	170.3	68.4	141.2	379.9	16.1
	1968	146.4	99.6	162.7	408.7	17.0
Nuclear physics	1967	92.5	47.6	208.2	348.3	14.8
	1968	90.3	52.9	154.6	297.8	12.4
Application of isotopes and radiation in medicine	1967	149.7	72.4	84.4	306.5	13.0
	1968	132.1	60.0	118.8	310.9	13.0
Total	1967	576.3	245.7	681.3	1503.3	63.8
	1968	522.6	262.8	708.5	1493.9	62.2
Total assistance	1967	870.8	519.5	964.9	2355.2	100.0
	1968	830.8	528.6	1041.8	2401.2	100.0

2. Geographical distribution of assistance

(a) Distribution by region

27. In order to present in detail the structure and distribution by region of technical assistance, Fig. 3 shows the source and amount of assistance provided under the Agency's regular programme and EPTA-UNDP(TA) in 1967, 1968 and 1959-1968. Fig. 3 also shows that the distribution of technical assistance by region did not vary by more than 2% as between 1967 and 1968 and, accordingly, in order to facilitate a comparison, more detailed data are given below, by region and field of activity, for the three main elements of assistance: experts, equipment and fellowships.

**FIGURE 2**  
**DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD OF ACTIVITY (1967 and 1968)**

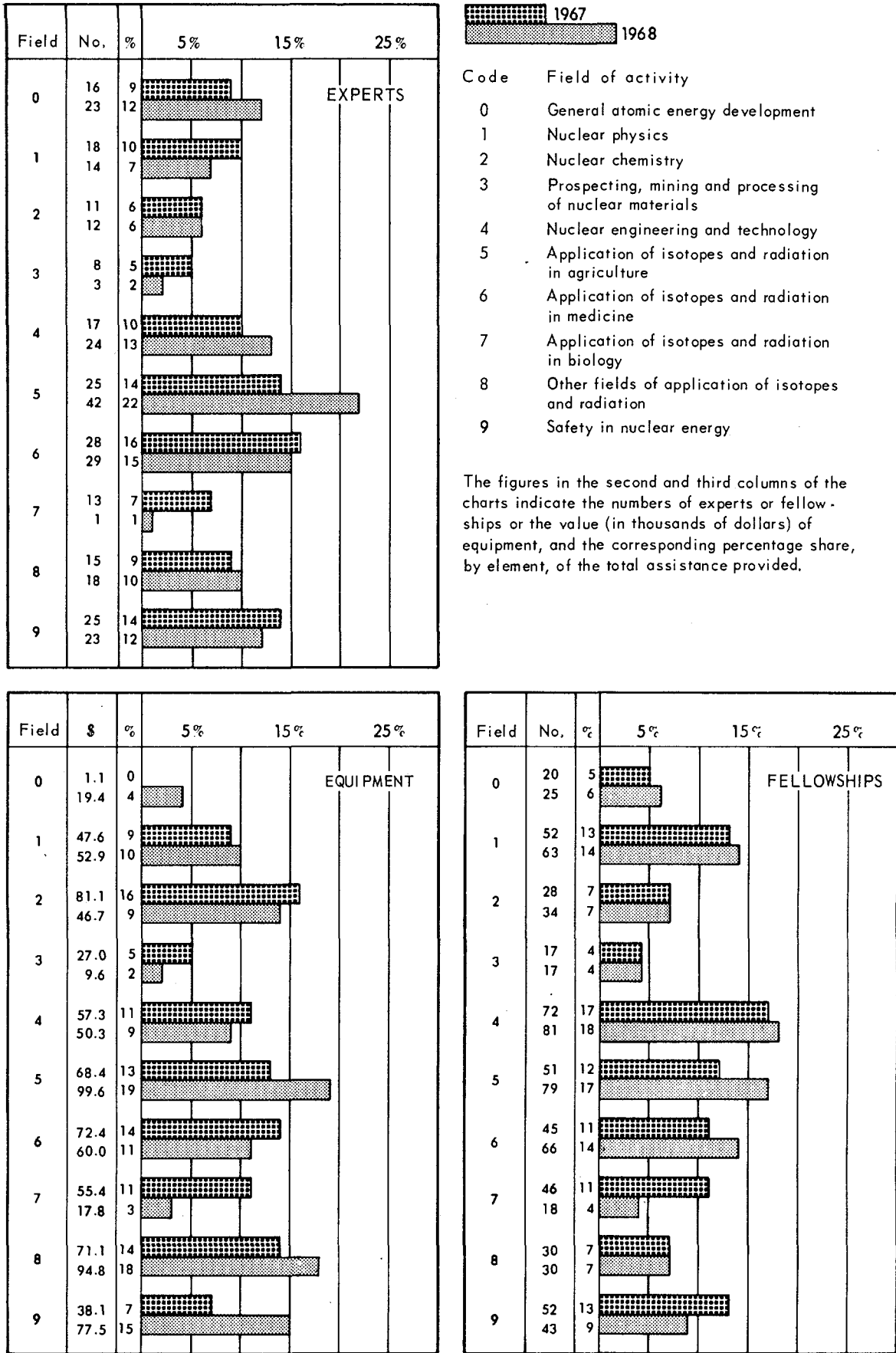
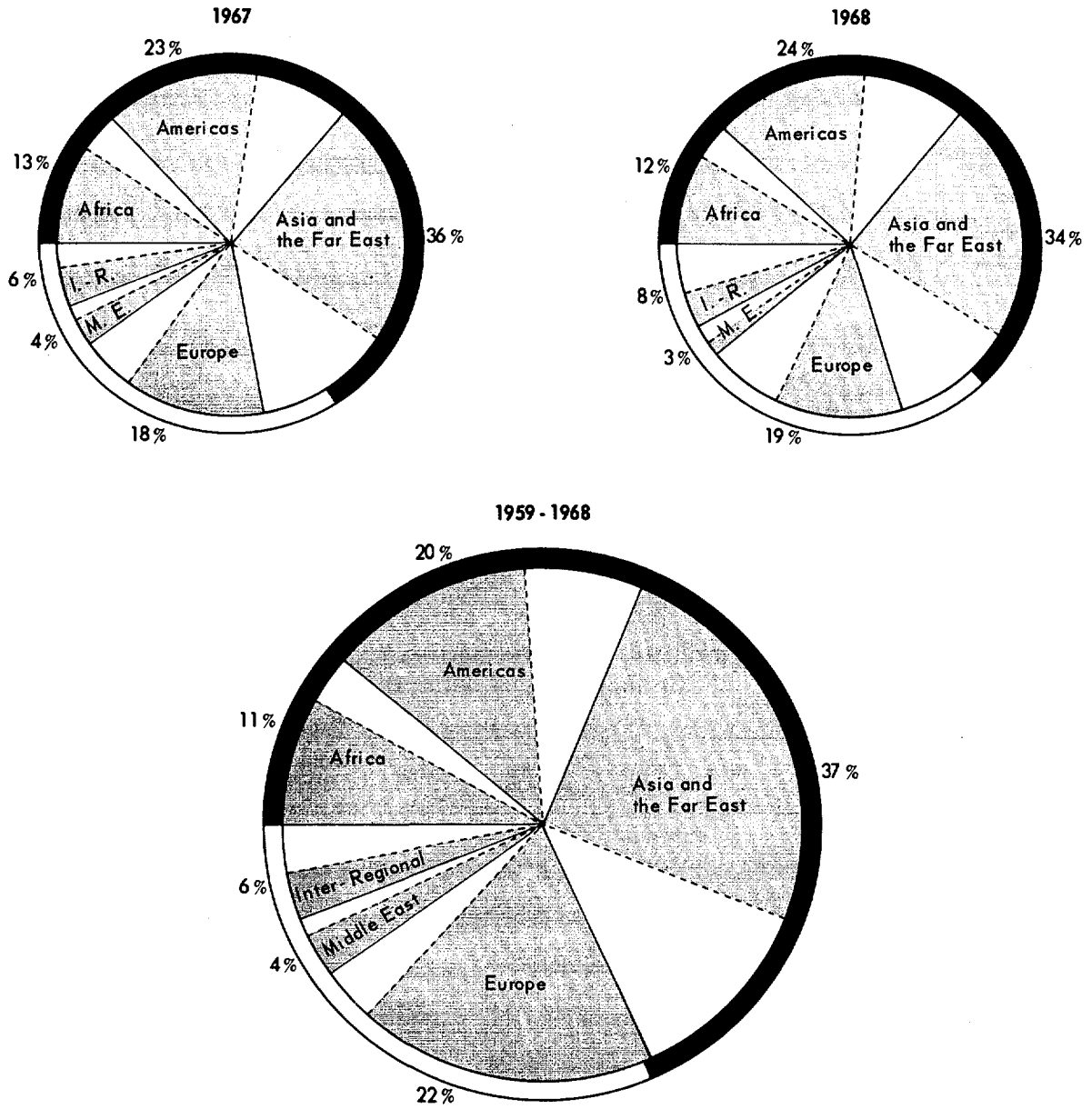

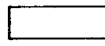


FIGURE 3

DISTRIBUTION OF TECHNICAL ASSISTANCE BY REGION AND SOURCE  
(1967, 1968 and 1968)



 Regular programme  
 EPTA-UNDP (TA)

 Total assistance under the regular programme

1967	65.8%
1968	62.9%
1959-1968	68.7%

## DISTRIBUTION OF EXPERTS' SERVICES

Field	Year	Africa		Americas		Asia and the Far East		Europe		Middle East		Inter-regional		Total		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
General atomic energy development	1967	-	-	15	10	-	-	-	-	1	2	-	-	16	12	9.1	2.4
	1968	-	-	7	11	-	-	1	5	2	9	13	3	23	28	12.2	6.4
Nuclear physics	1967	-	-	5	18	9	27	4	10	-	-	-	-	18	55	10.2	11.0
	1968	2	6	3	8	6	31	2	2	1	2	-	-	14	49	7.4	10.6
Nuclear chemistry	1967	2	12	2	16	4	17	3	6	-	-	-	-	11	51	6.3	10.2
	1968	1	2	4	12	5	17	-	-	2	5	-	-	12	36	6.4	7.8
Prospecting, mining and processing of nuclear materials	1967	2	15	5	18	1	1	-	-	-	-	-	-	8	34	4.5	6.8
	1968	1	12	1	1	-	-	1	2	-	-	-	-	3	15	1.6	3.2
Nuclear engineering and technology	1967	1	4	4	15	8	42	4	30	-	-	-	-	17	91	9.7	18.2
	1968	1	2	5	15	6	31	3	24	1	11	8	7	24	90	12.7	19.4
Application of isotopes and radiation in agriculture	1967	2	18	4	18	9	39	9	19	-	-	1	1	25	95	14.2	19.0
	1968	4	16	4	18	10	31	12	17	1	1	11	4	42	87	22.2	18.8
Application of isotopes and radiation in medicine	1967	3	23	13	8	9	54	1	3	1	2	1	1	28	91	15.9	18.2
	1968	4	33	6	20	4	18	2	2	-	-	13	3	29	76	15.3	16.4
Application of isotopes and radiation in biology	1967	-	-	8	9	-	-	1	1	-	-	4	1	13	11	7.4	2.2
	1968	-	-	1	3	-	-	-	-	-	-	-	-	1	3	0.5	0.7
Other fields of application of isotopes and radiation	1967	1	1	1	2	1	1	1	1	-	-	11	3	15	8	8.5	1.6
	1968	3	8	6	18	2	8	-	-	1	2	6	4	18	40	9.5	8.6
Safety in nuclear energy	1967	3	7	6	25	6	2	1	3	1	12	8	3	25	52	14.2	10.4
	1968	2	7	16	16	2	7	1	6	-	-	2	3	23	39	12.2	8.4
TOTAL	1967	14	80	63	139	47	183	24	73	3	16	25	9	176	500	100.0	100.0
	1968	16	86	53	122	35	143	22	58	8	30	53	24	189	483	100.0	100.0

(1) Number of experts.

(2) Man-months.

## DISTRIBUTION OF EQUIPMENT (in thousands of dollars)

Field	Year	Africa		Americas		Asia and the Far East		Europe		Middle East		Inter-regional		Total		Percentage of total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
General atomic energy development	1967	-	-	-	-	1.1	-	-	-	-	-	-	-	1.1	-	0.2	-
	1968	-	-	1.5	-	10.5	-	7.4	-	-	-	-	-	19.4	-	3.7	-
Nuclear physics	1967	-	-	13.8	-	14.5	-	19.3	-	-	-	-	-	47.6	-	9.2	-
	1968	-	-	25.7	-	27.2	-	-	-	-	-	-	-	52.9	-	10.0	-
Nuclear chemistry	1967	8.0	-	3.4	-	52.5	-	5.2	-	12.0	-	-	-	81.1	-	15.6	-
	1968	4.4	-	14.4	-	16.7	-	10.7	-	0.5	-	-	-	46.7	-	8.8	-
Prospecting, mining and processing of nuclear materials	1967	4.0	-	3.4	-	-	-	19.6	-	-	-	-	-	27.0	-	5.2	-
	1968	2.4	-	4.9	-	-	-	2.3	-	-	-	-	-	9.6	-	1.8	-
Nuclear engineering and technology	1967	1.6	-	21.9	-	30.4	-	3.4	-	-	-	-	-	57.3	-	11.0	-
	1968	6.5	-	18.8	-	17.8	-	-	-	1.1	-	6.1	-	50.3	-	9.5	-
Application of isotopes and radiation in agriculture	1967	25.4	-	7.4	-	28.6	-	0.2	-	4.3	-	2.5	-	68.4	-	13.2	-
	1968	21.9	-	18.8	-	44.7	-	13.8	-	-	-	0.4	-	99.6	-	18.8	-
Application of isotopes and radiation in medicine	1967	20.7	-	14.2	-	33.1	-	4.2	-	-	-	0.2	-	72.4	-	13.9	-
	1968	2.0	-	13.7	-	28.6	-	11.5	-	3.8	-	0.6	-	60.0	-	11.4	-
Application of isotopes and radiation in biology	1967	-	-	28.2	-	-	-	21.3	-	-	-	5.9	-	55.4	-	10.7	-
	1968	-	-	7.4	-	-	-	10.4	-	-	-	-	-	17.8	-	3.4	-
Other fields of application of isotopes and radiation	1967	12.1	-	20.4	-	-	-	8.1	-	14.9	-	15.6	-	71.1	-	13.7	-
	1968	0.5	-	62.9	-	20.8	-	1.7	-	-	-	8.9	-	94.8	-	17.9	-
Safety in nuclear energy	1967	9.8	-	20.8	-	1.6	-	-	-	2.9	-	3.0	-	38.1	-	7.3	-
	1968	12.0	-	13.5	-	1.0	-	49.9	-	1.0	-	0.1	-	77.5	-	14.7	-
TOTAL	1967	81.6	-	133.5	-	161.8	-	81.3	-	34.1	-	27.2	-	519.5	-	100.0	-
	1968	49.7	-	181.6	-	167.3	-	107.7	-	6.2	-	18.1	-	528.6	-	100.0	-



## DISTRIBUTION OF FELLOWSHIPS

Field	Year	Africa		Americas		Asia and the Far East		Europe		Middle East		Inter-regional		Total		Percentage of Total	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
		General atomic energy development	1967	3	18	14	2	-	-	3	19	-	-	-	-	20	39
	1968	-	-	1	3	1	2	1	4	1	3	21	6	25	18	5.5	0.6
Nuclear physics	1967	4	36	8	74	13	146	25	240	2	18	-	-	52	514	12.6	18.5
	1968	10	84	9	77	15	150	24	231	6	68	-	-	83	510	13.8	18.9
Nuclear chemistry	1967	2	23	4	48	9	95	12	120	1	10	-	-	28	296	6.8	10.7
	1968	4	36	3	34	13	134	12	111	2	22	-	-	34	337	7.5	10.5
Prospecting, mining and processing of nuclear materials	1967	6	37	3	34	2	16	6	53	-	-	-	-	17	140	4.1	5.0
	1968	8	24	5	30	4	40	4	44	1	12	-	-	17	150	3.7	4.1
Nuclear engineering and technology	1967	5	51	8	86	32	322	25	201	2	24	-	-	72	684	17.4	24.6
	1968	5	50	10	103	31	298	16	145	3	34	16	48	81	678	17.3	21.0
Application of isotopes and radiation in agriculture	1967	2	22	2	24	16	156	11	97	1	1	19	38	51	338	12.4	12.2
	1968	8	67	4	22	23	227	23	165	2	5	19	15	79	501	17.3	15.5
Application of isotopes and radiation in medicine	1967	2	24	17	57	17	153	8	64	1	1	-	-	45	299	10.9	10.8
	1968	2	24	9	91	6	47	9	78	3	25	37	106	66	371	14.5	11.5
Application of isotopes and radiation in biology	1967	-	-	12	27	3	36	11	109	-	-	20	10	46	182	11.1	6.5
	1968	-	-	5	54	8	83	4	36	1	8	-	-	16	181	3.9	5.6
Other fields of application of isotopes and radiation	1967	-	-	2	7	4	43	2	14	-	-	22	58	30	122	7.3	4.4
	1968	1	5	3	18	4	26	5	35	-	-	17	55	30	139	6.6	4.3
Safety in nuclear energy	1967	3	18	6	42	14	48	21	2	2	22	25	13	52	164	12.6	5.9
	1968	3	30	11	29	6	86	5	52	2	20	14	21	43	240	9.4	7.4
<b>TOTAL</b>	1967	27	229	76	401	110	1015	105	938	9	76	86	119	413	2778	100.0	100.0
	1968	36	320	59	461	113	1085	103	901	21	107	124	251	456	3225	100.0	100.0

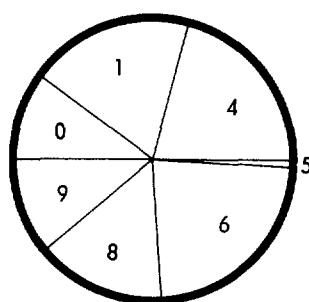
(1) Number of fellowships.

(2) Man-months.

FIGURE 4

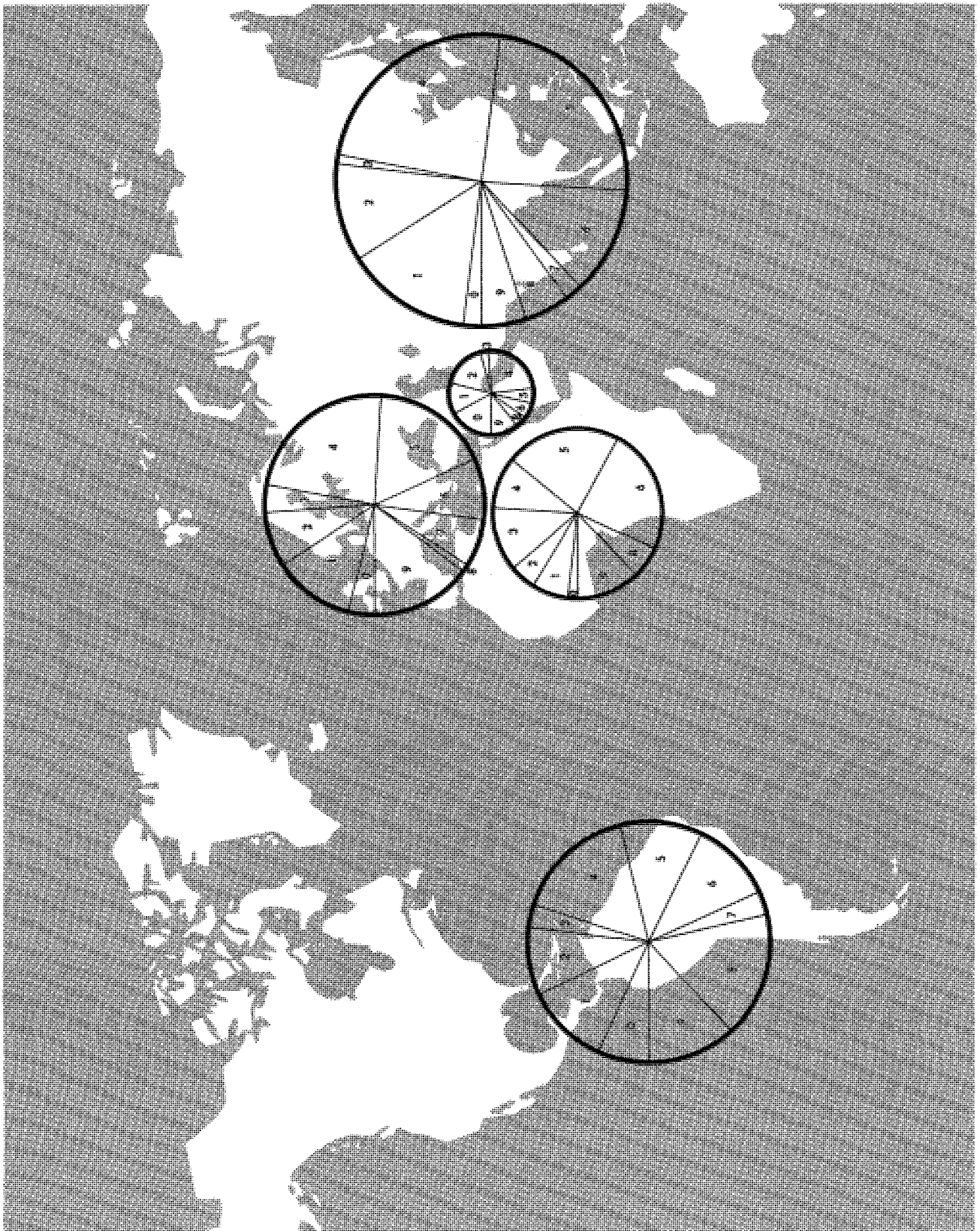
DISTRIBUTION OF TECHNICAL ASSISTANCE BY FIELD OF ACTIVITY AND BY REGION: 1968 <sup>a)</sup>

Field	Africa %	Americas %	Asia and the Far East %	Europe %	Middle East %	Inter- regional %
0 - General atomic energy development	2	7	2	4	17	10
1 - Nuclear physics	7	11	14	12	12	19
2 - Nuclear chemistry	5	9	11	8	17	-
3 - Prospecting, mining and processing of nuclear materials	12	3	1	4	3	-
4 - Nuclear engineering and technology	10	16	24	23	24	21
5 - Application of isotopes and radiation in agriculture	22	11	24	17	6	1
6 - Application of isotopes and radiation in medicine	24	11	12	9	6	23
7 - Application of isotopes and radiation in biology	-	3	2	7	-	-
8 - Other fields of application of isotopes and radiation	6	17	5	1	4	15
9 - Safety in nuclear energy	12	12	5	15	11	11
	100 %	100 %	100 %	100 %	100 %	100 %

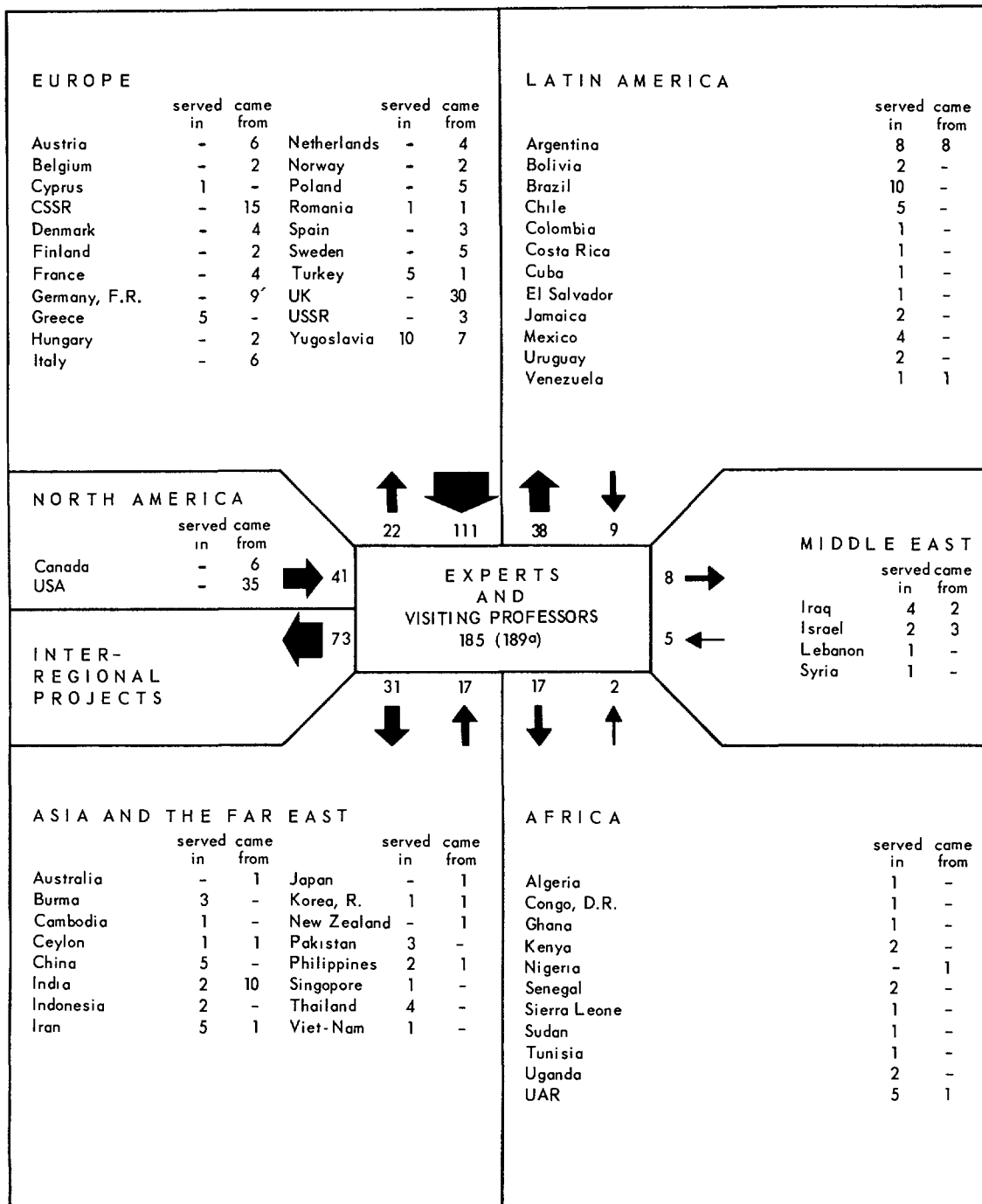


INTER-REGIONAL

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



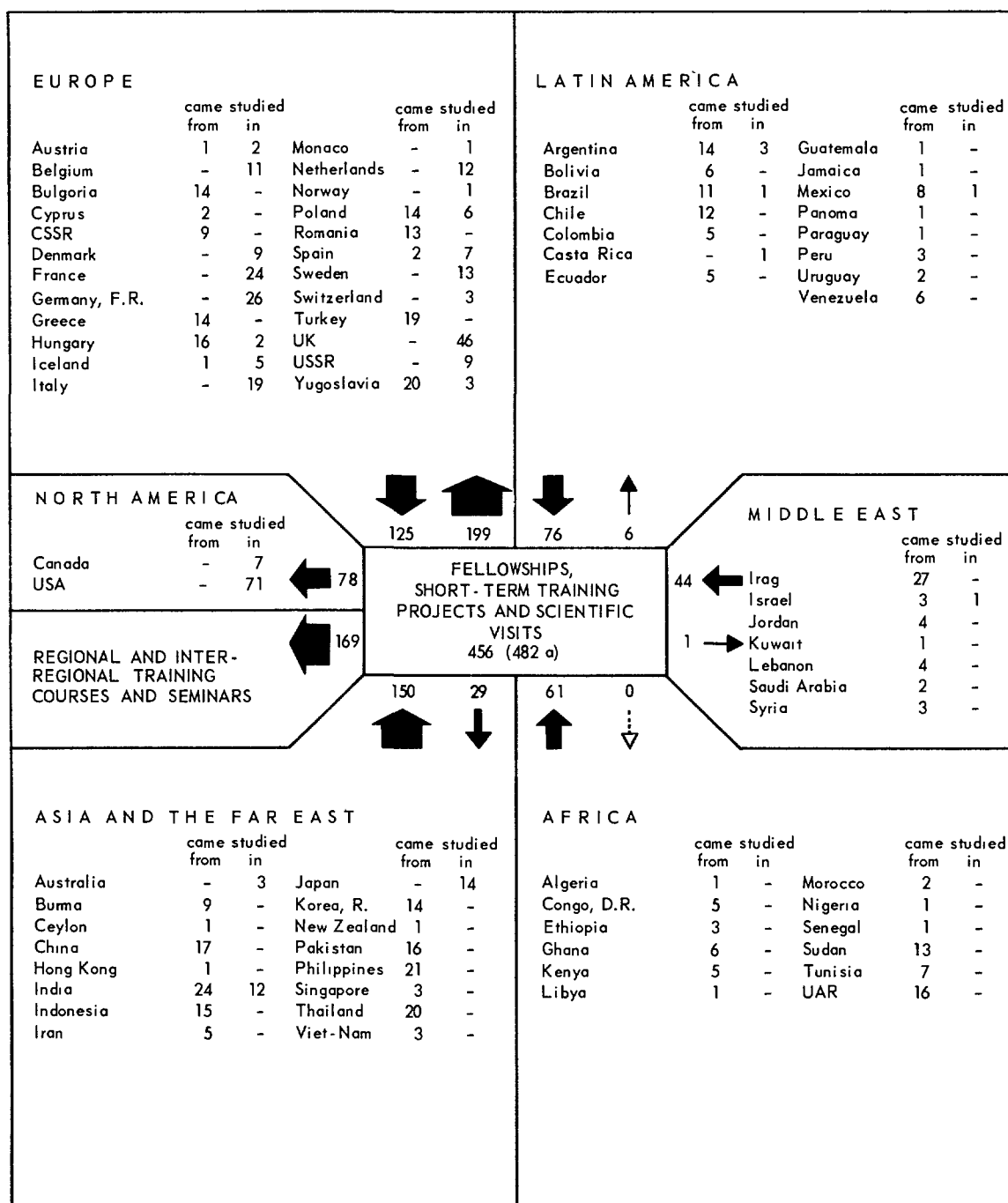
**FIGURE 5**  
**DISTRIBUTION OF TECHNICAL ASSISTANCE EXPERTS BY REGION: 1968**



a) The difference between the number of assignments (189) and the actual number of experts (185) is due to the fact that each of four experts served in two countries.

FIGURE 6

DISTRIBUTION OF TECHNICAL ASSISTANCE FELLOWSHIPS BY REGION: 1968



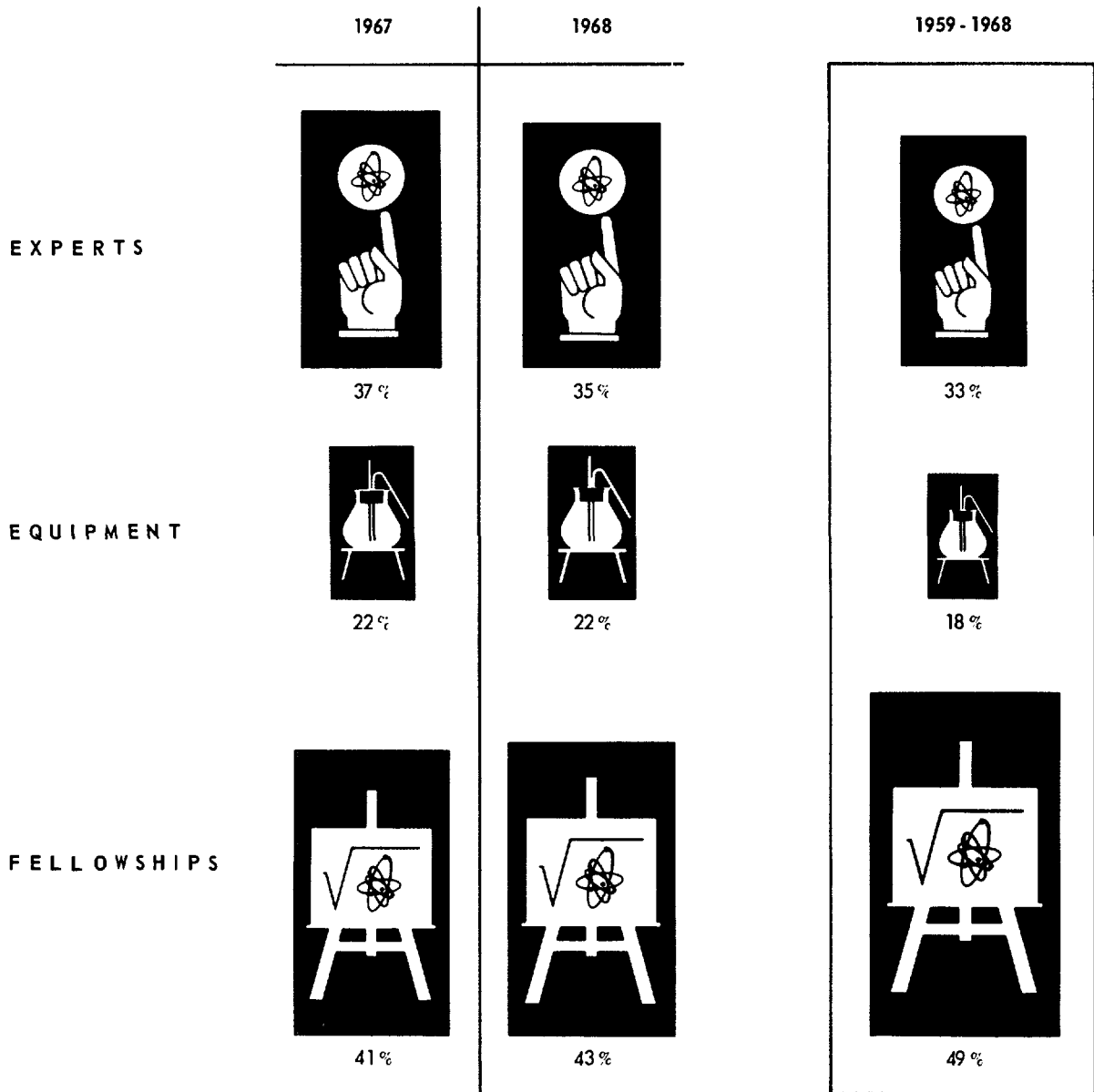
a) The difference between the number of fellows (456) and the number of places of study (482) is due to the fact that five fellows studied in two different countries, whereas two holders of an award for scientific visits went to two, three to three, three to four, and one to five different countries.

(b) Distribution by country

28. The number of countries which received technical assistance in 1968 was 67, representing an increase of about 10% over 1967 and about 5% over 1966, when the number was 61 and 64 respectively. Twenty-three countries both received and provided assistance, which included acting as hosts for training courses and scientific visits, as against 20 countries in 1967. Seventeen countries provided but did not receive technical assistance in 1968, compared with 14 in 1967. In 1968, 44 countries were recipients only, as compared with 41 in 1967. Figs 5 and 6 and Table 3 show the extent to which skills and knowledge were exchanged between countries.

FIGURE 7

DISTRIBUTION OF TECHNICAL ASSISTANCE BY TYPE OF ASSISTANCE  
(1967, 1968 and 1959 - 1968)



Note: Fellowships include participants at training courses and special projects.

### 3. Types of assistance

29. As shown in Fig. 7, the technical assistance provided in 1967, 1968 and over the period 1959-1968 was distributed, by type, as follows:

	<u>Experts</u>	<u>Equipment</u>	<u>Fellowships</u>
1967	37%	22%	41%
1968	35%	22%	43%
1959-1968	33%	18%	49%

#### (a) Experts and visiting professors

30. In 1968, 185 experts from 35 countries served a total of 462 man-months at a cost of \$830 800 as compared with 172 experts from 39 countries who served a total of 500 man-months at a cost of \$870 800 in 1967. In addition, unliquidated obligations as of 31 December 1968 totalled \$753 700. Each of four experts served in two countries and 108 experts were each assigned to one country; a total of 44 countries - as in 1967 - were provided with country programme experts, and an additional 73 experts and visiting professors were engaged in 18 regional and inter-regional projects (19 partly cost-free and seven cost-free experts were provided, as compared with one partly cost-free and four cost-free experts in 1967). The total cost of providing experts' services was about 5% less than in 1967, but nearly 8% fewer man-months were served. The increase of 3% in the average cost per man-month would have been somewhat higher if the assignments of experts for short-term regional projects had been as short in duration as in 1967, i. e. an average of two weeks as against three weeks in 1968.

#### (b) Equipment

31. Including the value of grants of equipment made during 1968, 42 countries and seven international projects were provided with equipment to a value of \$528 600, which represents an increase of 2% over 1967. In addition, equipment valued at \$703 800 had not yet been delivered by the end of the year; this amount is included in the figures given in columns (9) and (10) of Table 4.

32. The equipment provided in 1968 was supplied by 23 countries (four more than in 1967) as a result of the Agency's efforts to spread purchases over a large number of countries, while bearing in mind the need to meet the special requirements of requesting countries, buy at a reasonable price and utilize, to the extent possible, all the available currencies.

#### (c) Fellowships

33. As indicated in Fig. 6 and Tables 3 and 6, 456 fellows from 59 countries received awards under the training programme in 1968. The increase from \$964 300 in 1967 to \$1 041 800 in 1968 in the total value of fellowship training actually provided is due to the higher total of man-months (2778 in 1967 and 3225 man-months in 1968). Country programme awards increased in 1968 by 46 over 1967: the number of UNDP(TA) fellowships increased from 18 to 46, Type I fellowships from 113 to 121, and Type II fellowships from 138 to 148. The estimated value of fellowship training which had not been provided by 31 December 1968 amounted to \$1 077 200.

34. A comparison of the nominations and awards for country programme fellowships in 1967 and 1968 and of all awards made during those two years is given below.

<u>Country programme awards</u>	<u>1967</u>	<u>1968</u>
Nominations received	387	458
Effective awards [ 6 ]		
Individual projects	244	299
International projects	25	16
Percentage of nominations which led to effective awards	69.5%	68.8%
<u>Other international training awards</u>		
Research grants and scientific visits	11	9
Short-term training projects	133	132
Total number of awards	413	456

(d) Regional and inter-regional activities [ 7 ]

(i) Regional advisers

35. One expert on the use of radioisotopes in hydrology served as a regional adviser in Africa. Two experts served as regional advisers in Latin America (one on hospital physics and one on the industrial applications of radioisotopes), and two in Asia and the Far East (one on the industrial applications of radioisotopes and one on rice production). The assignments of all five regional advisers were financed under UNDP(TA).

(ii) Short-term training projects

36. The Agency organized 12 short-term regional and inter-regional training projects in 1968 in 16 different countries, in which there were more than 500 participants from 52 countries, the cost in respect of nationals of 46 countries being paid by the Agency. The following eight projects were financed under UNDP(TA): a visiting seminar in Argentina, Brazil, Chile, Colombia, Mexico, Uruguay and Venezuela; a study tour in Czechoslovakia, Poland and the Soviet Union; four training courses held in Brazil, Italy, Romania and the Soviet Union respectively, and two training courses at the Middle East Regional Radioisotope Centre for the Arab Countries. The remaining four projects were financed under the Agency's regular programme: a visiting seminar in Argentina, Brazil, Colombia, Mexico, Uruguay and Venezuela and three training courses, one at Agency Headquarters, one in the Federal Republic of Germany and one in the United Kingdom. The Agency provided 66 lecturers, including 26 from its own staff, and others were made available by host countries. Six training courses were on the applications of isotopes and radiation (one in agriculture, three in medicine, one on general applications and one on industrial applications), one course was on the legal aspects of the utilization of atomic energy, one course dealt with the maintenance of nuclear electronic equipment, and a study tour, one training course and two visiting seminars were devoted to safety in nuclear energy.

[ 6 ] Total number of awards less withdrawals as at 31 December.

[ 7 ] Regional and inter-regional projects are listed in Annex II.



37. As indicated in paragraph 34 above, 132 awards were made for participation in 12 Agency short-term training projects. In addition, some 370 local participants, plus those for whom the cost of participation was borne by another organization or by the candidate's Government, constituted a second group of participants who were three times greater in number than those financed by the Agency; only the latter group is included in the statistical tables.

(iii) Middle Eastern Regional Radioisotope Centre for the Arab Countries

38. As mentioned above, two training courses were held at the Centre during 1968, one four-month course on general applications and one eight-week course on industrial applications of isotopes and radiation. Twenty-one trainees participated in the first course (10 from the UAR and 11 from countries in the region) and 16 in the second training course (10 from the UAR and six from countries in the region). The technical adviser on the industrial applications of radioisotopes served for a period of three months, and in 1968 technical assistance valued at about \$53 000, including unliquidated obligations at the end of the year was provided under UNDP(TA).

39. In 1968, financial support for the Centre under UNDP(TA) was terminated. Since 1962, a sum of nearly \$180 000 has been provided towards meeting the cost of lecturers and trainees at 11 training courses (attended by more than 150 participants), the services of three technical advisers and the purchase of demonstration equipment.

40. Training has been given in a variety of subjects ranging from general applications of nuclear energy for different purposes to industrial applications and the use of nuclear instrumentation. On completing their studies fellows return to their home countries with an extensive knowledge of nuclear techniques which can be used to promote development. In addition, the equipment provided by the Agency will be available for future research programmes designed to assist in the solution of regional problems.

41. Although UNDP(TA) no longer provides financial support, the staff will continue to receive help and guidance from colleagues in the Agency's Laboratory in Seibersdorf. The Director General of the Agency will be represented on the Centre's Scientific Advisory Committee.

(iv) Follow-up missions

42. In 1968 five one-man missions were sent to the regions to determine needs and discuss development plans with requesting countries. The cost of sending staff members on these missions averaged \$202 for each of the 44 countries visited.

C. UNDP(SF)

43. The Central American regional project to evaluate the possibilities of utilizing the sterile male technique to eradicate or control the Mediterranean fruit fly, Ceratitis capitata Wied., is scheduled to terminate on 30 June 1969. Although the final report will not be available until after the termination of field operations financed by UNDP(SF), the available data are encouraging. Although high winds, mountainous terrain, and low clouds all present difficulties in the aerial release of the sterile flies, the data indicated a better than 95% reduction in fruit infested with medfly larvae in the experimental area in Nicaragua during February 1969. The mass-rearing laboratory in San José, Costa Rica, has continued to produce about 40 million flies per week. It is believed that with continued research and development, the sterile male technique can be economically utilized to eradicate or control the Mediterranean fruit fly.

44. The five-year project on nuclear research in agriculture in India, which was approved by the UNDP Governing Council in January 1968, commenced when the Plan of Operation was signed on 10 October 1968. Four Indian research centres participate in this project, which provides for extensive co-operation with the agricultural extension commissions of the various States, with other research institutes and in both private and bilateral aid programmes, in related fields of research, so that farmers can benefit from the project. The Project Manager has been in the field for some time, two experts have been assigned to the project and work is progressing satisfactorily.

45. During 1968, 11 experts were engaged in UNDP(SF) projects for which the Agency serves as executing agency, and about \$125 000 was obligated for equipment. In addition, the Agency acted as sub-contractor to FAO in respect of six UNDP(SF) projects involving short-term advisory services and water analyses, which are listed in Annex III, at a total cost of about \$17 600. It is expected that the sub-contractor work done by the Agency for other executing agencies will continue to expand and that it will include the provision of advice on industrial applications of isotopes and radiation, for example in water pollution studies.

#### D. Evaluation of the technical assistance programme

##### 1. General

46. During 1968, ECOSOC continued to have under review current studies and programmes concerned with the evaluation of technical co-operation programmes. Continuing the series of evaluation missions sent to different countries, of which three had already been dispatched, the Secretary-General of the United Nations dispatched two further missions in 1968. Their main objective was to appraise the effectiveness and the overall impact of the combined programmes of United Nations organizations on the development of the recipient countries in terms of performance and the results achieved. The terms of reference of the missions dispatched in 1968 were revised in the light of the experience of previous missions, resulting in an improvement in the preparation of the missions. The Agency provided detailed information on its projects in the two countries to be visited and briefed one of the missions in Vienna. The reports will be submitted to ECOSOC in 1969; although the draft reports make no specific reference to the Agency, some of the general recommendations are relevant to its practices in assisting developing countries. The most important conclusion reached by all five missions was that it was essential that Governments should carry out more adequate programme and project planning at the initial stage; this conclusion is reflected in the reports of Agency preliminary assistance missions and follow-up missions, which are concerned primarily with the formulation of projects whose objectives are in keeping with national development plans.

47. The work done by the Inter-Agency Study Group on Evaluation, on which the Agency is represented, together with the reports of the evaluation missions, help to clarify some of the complex issues involved in technical assistance activities and lay the basis for further improvement. In this connection ECOSOC has emphasized that evaluation activities should always aim at ensuring that the principles of good management are applied at all stages of project implementation, and in 1969 ECOSOC will carry out a broad review of the policies and procedures followed by United Nations organizations in evaluating technical co-operation programmes.

48. It has been stated that the assistance provided by United Nations organizations to most countries is a small percentage of the total assistance supplied by outside sources; furthermore, the total external aid provided to a country usually constitutes only a fraction of the national development programme, and this should be borne in mind in evaluating the contribution of such aid to the national economy. Similarly, the projects which together form the Agency's programme of technical assistance, cannot be evaluated in isolation from the larger projects of which they form a part. However, the Agency's programme in 1968 reflected the different stages to which nuclear energy had developed in different regions. For example, following the visits of preliminary assistance missions several countries had felt the need to draw up a phased programme for the introduction of nuclear techniques into their scientific and technical development programmes: three experts were assigned in 1968 in countries whose atomic energy programmes were at different stages of development and their final reports stressed the need for integrating those programmes into the national development plan.

49. In the first case, the expert found that the necessary infrastructure, universities, hospitals, agricultural research institutes, etc. were available, together with trained manpower on a limited scale. It was therefore possible to identify the activities to which priority should be given with regard to the use of nuclear techniques and facilities. In the second case, while the expert did not recommend that nuclear reactors be included in the programme at that stage, he suggested that organizations responsible for meeting the future needs of the country, especially universities, should undertake the necessary pure research which would constitute the basis of all future applied research activities and that, simultaneously, some nuclear techniques should be introduced into those technical services which had the necessary trained personnel.

50. In the third case, in addition to making recommendations concerning the development of a co-ordinated programme involving the use of nuclear techniques, the expert suggested investigating the possibilities of establishing joint programmes with neighbouring countries and the possible interchange, when appropriate, of staff. It was suggested that there should be phased programmes spread over several years, which would be carried out either by using an existing research reactor facility or by expanding the existing facilities for research, training and education. This step-by-step approach has been adopted, for example, in a project designed to test the feasibility of the sterile male technique to eradicate the fruit fly population on an island. The expert was in favour of carrying out the proposed work but recommended that, before embarking on a major project (which would require further aid), more tests should be carried out by the Government.

51. Up to the present, assignments of atomic energy planners have been carried out in nine countries; in another country the Government has asked the expert to go over the final draft of the next five-year development plan and identify projects which may require the use of nuclear techniques. In one case, the Government, after a four-year interval, has decided to implement the expert's recommendations relating to the first phase of its programme and has asked that he should return and bring his findings up to date.

52. The research reactors which were established in the mid-1950's continue to act as catalysts and contribute to economic and social development. In the case of training, including the training of research workers, this is exemplified in one country where a sister-laboratory arrangement (consisting of a joint programme in neutron and solid state physics) has been negotiated and supported by the Agency. Long-term plans covering an exchange of scientists are now being implemented. In another country, the work of the nuclear centre is being closely associated with the institute of physics at a newly-established university. Two experts assigned to the centre assisted in the academic programme of the institute and promoted further co-operation which will play a significant part in the development of the university.

53. The introduction of basic atomic energy techniques and concepts has frequently prepared the ground for the future by making countries aware of the potential contribution of nuclear physics and nuclear energy applications to development. In the case of research reactors, however, governmental agencies have occasionally failed to act on the recommendations of Agency experts. In addition, a reluctance to take the practical, routine action required, not only with regard to research projects but also in the use of radioisotopes in agriculture and medical diagnosis and therapy, has been noted, and experts have given close attention to this problem.

54. One country is building a reactor complex with the assistance of experts from six different countries and a programme for its utilization is being drawn up. It is hoped to develop the reactor centre into a central regional laboratory for physics research which will assist in the scientific development programmes of countries in the region. Radioisotope production is meeting an increasing number of domestic needs, and one country now produces all the radioisotopes it needs for medical purposes; elsewhere, radioisotopes are being produced for agricultural research stations, research programmes in institutes of higher education, and for industry.

55. Governments have commented favourably on the provision of equipment to existing centres and institutes. The provision of relatively small and inexpensive items, for which foreign exchange was not available, has prepared the way for the introduction of new techniques. In one country, the provision of a photo-dot scanner enabled radioisotope techniques to be used in the study of goitre and problems of human behaviour at high altitudes. In another instance, relatively expensive equipment was provided to an atomic energy commission; in the view of the Government, its contribution to technical progress and increased efficiency in production outweighed its cost.

56. At a research centre, the services of the experts and the equipment provided have been co-ordinated with scientific activities within the national programme, and the assistance received has made a valuable complementary contribution to the work of scientists. In another case an expert introduced modern techniques of measuring radiation and studying tumours; his work was greatly facilitated by a relatively small amount of equipment which enabled him to carry out lectures and practical demonstrations, and this equipment continues to be used. One Government has stated that some two years after an expert completed his long-term assignment, the equipment provided is fully utilized in training students doing nuclear physics laboratory work. The equipment is in good running order, and the programme initiated by the expert has led to an increasing number of students. In two cases, in which the work was initially done with a small amount of equipment and with expert assistance, electronic apparatus has been designed and will be manufactured commercially in the countries concerned.

57. With only a very few exceptions, all recipient Governments have commented on the outstanding technical and personal qualifications of the Agency's experts. One recipient Government has stressed that although it is a net provider of experts, the provision of Agency experts is essential to enable it to carry out its development plans. In another instance, in which an expert was assigned to a country within his own region, his cultural background greatly facilitated his work and helped to make his recommendations more acceptable. Experts have also continued to demonstrate their adaptability. The impact an expert can make can be greatly enhanced by the provision of adequate and appropriate counterparts in the form both of personnel and equipment.

58. Both the donor and the recipient need to bear in mind the commitments which acceptance of a project will entail; the Government must, for example, be prepared to provide counterparts and to take the necessary follow-up action. This is taken into account by the Agency when appraising projects and has led to a reduction in the number of experts who, on taking up their assignments, complain of a lack of counterparts to whom they can transfer their knowledge. This reduction is also attributable to careful planning by the Government and the Agency and to the timing of fellowship awards, granted either by the Agency or under bilateral auspices, to coincide with expert assignments.

59. In one country, in-service training of counterparts enabled a project to be concluded successfully, but in another country there were delays owing to the poor timing by the Government in scheduling fellowship training. In a third country, the expert is a member of a research team which acts as his counterpart. In one country, however, an expert followed another expert after a year's interval only to find the trained counterpart was unavailable; however, he carried out the assignment and demonstrated the need of nuclear techniques in medical diagnosis by treating nearly 100 patients a month.

60. During recent years, all United Nations organizations have been giving particular attention to the follow-up of expert recommendations and the investigation of investment possibilities on completion of projects. Most Agency projects are short-term and, except for those financed by UNDP(SF), their successful completion and the follow-up action do not involve high expenditure. Assurances have been received from several countries that the recommendations in experts' final reports are implemented, provided they are in keeping with the country's development programme and can be given the required priority. In such cases the reports constitute, in effect, the programme of the next project, or the next phase in an existing project. With certain projects, this raises the question of how the results of the research undertaken in, for example, agricultural institutes, should be disseminated. In one country, these are sent to the Ministry of Agriculture and communicated to farmers through the national extension services. Elsewhere, reports by an expert in food irradiation were distributed by the Government to all the institutes and organizations concerned with the food industry, and copies have also been sent to other Governments which were interested.

61. An example of another successful method of disseminating results of research and development carried out in the developed countries can be found in the work of an expert who was assigned to a region for a period of only six months. During this time, in visits lasting two to three weeks in each country, he was able to assist local authorities to promote the industrial applications of radiation and isotopes which were of practical value in the countries concerned. In some countries, this was done by ensuring that industry was aware of the potential advantages of such applications and could derive the benefits in the most economic way; in other countries, the expert was instrumental in establishing better working relations between the various industries and the atomic energy commission.

## 2. Evaluation of Agency programmes and projects

### (a) Soil science

62. Average crop yields in developing countries are often far less than they should be, the main reason being that the best methods of using fertilizer and water, singly and in combination, have often not yet been developed in the countries concerned. Techniques involving the use of radiation and isotopes are invaluable in studies whose purpose is to increase yields through a better understanding of the soil-water-plant relationships and the development of agricultural practices that ensure the best conditions for plant growth. This was amply demonstrated by the large number of requests received for technical assistance; about 18 projects relating to soils, irrigation and crop production were implemented during 1968, for which the services of highly qualified experts and the necessary equipment were provided.

63. As the availability of well-trained counterparts is essential at the time of an expert's arrival in order to ensure the successful completion of projects and the continuation of the research work initiated by the expert following his departure, the timing of fellowships was co-ordinated whenever possible with the provision of other elements of assistance. Such co-ordination is very useful, especially when the use of isotope and radiation techniques to study soil-water-plant relationships is first introduced.

64. The use of radiation and isotopes has led to a much wider knowledge of certain factors involved in soil chemistry and soil fertility, such as the absorption and exchange, movement and fixation of ions, the availability of nutrient elements and their uptake by plants, the capacity of soil to supply nutrients, and the turnover of organic matter, all of which are very important in plant nutrition and in assessing soil fertility. Isotopes are also extremely useful in evaluating chemical fertilizers and measuring their eventual residual effect, and in investigating the rooting pattern and activity of plants, a knowledge of which is essential for effective fertilizer application. Great increases in yields could be achieved through the more efficient use of fertilizers; isotopes can be used to determine the proper time and the most adequate method of fertilizer application, including the foliar application.

65. Water use efficiency studies would lead to the best possible use of the limited amounts of water, and this, in turn, would increase the production of food and fibres obtainable from a given amount of water and contribute to the national economy by enabling crops and crop rotations and the most profitable irrigation projects to be chosen on a sound economic basis. Though the importance of and the great need for water use efficiency studies have been well known to agronomists for a long time, the research data available are relatively scanty. This is mainly because it is difficult and costly to obtain valid data on evapotranspiration, which serves as the basis for such studies and for a comparison of the effects of various agricultural practices on water use and its efficiency, since numerous soil-moisture measurements at various depths would be required and such measurements are usually tedious, time-consuming and destructive. The various types of portable radiation equipment are very valuable in agricultural research, in which extensive, low-cost soil-moisture studies can be carried out. The neutron moisture meter equilibrates instantaneously with the soil moisture, is almost insensitive to changes in salt concentration in the soil and permits reliable, rapid and non-destructive soil-moisture measurements to be made at the desired depths, thus making it possible to undertake extensive water use efficiency studies.

(b) Entomology and insecticide residues

66. Nuclear techniques, including the use of radiation and radioisotopes, are playing an increasing role in insect control and eradication programmes. It is essential that agricultural crops, human beings and domestic animals be protected against the ravages of the many different species of harmful insects.

67. The sterile male technique, involving the use of gamma radiation to sterilize insects, is continuing to receive increased attention as a means of insect control or eradication. The Agency's assistance to Member States includes a regional UNDP(SF) project in Central America for controlling and eradicating the Mediterranean fruit fly and many other technical assistance projects in nearly all areas of the world. These projects concentrate on the effective use of the sterile male technique and include mass rearing, population density studies, sterilization research, general ecological studies, etc. In addition, training courses are conducted to teach promising young scientists the sterile male technique. It should be noted that an Agency panel on the sterile male technique held in 1968 concluded that sufficient information is available to conduct field experiments on more than 30 species of harmful insects. It also estimated that each field test would require several years and cost from \$50 000 to \$500 000 per year.

68. Radioisotopes are frequently used in conjunction with insecticide studies. These include studies of the metabolic fate of the insecticide in the target organism and of the plant or animal to which it is applied, mode-of-action studies to determine how the insecticide kills the insect, and studies of residues in foods to ensure that the widespread use of the insecticide is safe. A long-term technical assistance project concerned with insecticide residues in the tsetse fly control programmes has been started in East Africa.

69. The presence of insecticide residues in agricultural commodities is a matter of growing concern in international trade and the use of nuclear techniques to assay these residues is therefore of interest to the Agency. The quantities of such residues which can constitute a health hazard may be so minute that it is difficult to detect them by chemical analysis. The use of nuclear techniques, such as neutron activation and radioisotope labelling analysis, is not only a quick and useful method of analysis but sometimes the only effective means of detection. At a recent panel held to consider such matters, it was recommended that the Agency, in collaboration with FAO, WHO and IUPAC, should organize an international research study to determine the movement of some important pesticides through certain foods from the time of their application in the field to the time the food is consumed by man.

(c) Food preservation

70. In order to increase food supplies, both FAO and the Agency give priority to furthering the development of techniques for reducing losses of food during storage. Developing countries have become increasingly interested in acquiring information on the possible application of radiation in the preservation of food. It has been amply demonstrated that irradiation treatment is effective in the control of insect infestation in grain and other food products during storage, and that it extends the market life of such items as fresh fruits, vegetables and meat and inhibits the sprouting of onions and potatoes.

71. In response to requests from developing countries the Agency provided assistance in 1968 to eight countries in establishing and developing their national research programmes in food preservation by irradiation. This assistance took the form of equipment, such as irradiation sources, and experts. A marked extension in the market life of refrigerated fresh fish and sea food has been brought about by relatively low doses of radiation. This could provide a means of improving local distribution and of supplying more distant markets. To further investigate these possibilities, a co-operative project was organized in Iceland between the Agency, the Government of Iceland and the United States Atomic Energy Commission. A small portable pilot plant irradiator is being used to treat fresh fish and sea food experimentally in order to determine the feasibility of such treatment under conditions existing in Iceland. A number of observers from Member States have been sent to Iceland on Agency fellowships of two months each to enable them to determine for themselves whether this treatment would be feasible in their home countries.

72. One of the most effective ways to exchange information and gain a better understanding of technical subjects is through meetings where all the participants can take part in the discussions. This was borne out, for example, at a meeting of a study group on food irradiation for the Balkan countries which was held in Sofia, Bulgaria, especially for research workers in food irradiation, who discussed the problems of research in the various countries concerned and the possible applications of irradiation to the products of most interest in the area.

(d) Nuclear raw materials and use of nuclear instrumentation in prospecting and analysis

(i) Nuclear raw materials

73. Because of the forecasts of a rising demand for nuclear power the search for nuclear raw materials, especially uranium, has been intensified. It is estimated that adequate low-cost uranium reserves will be available up to the mid-1970's, but uranium requirements in the late 1970's and subsequently may have to be met from reserves which have yet to be discovered and evaluated. Since it may not be possible to undertake production until about six to ten years following the beginning of exploration, it is considered to be of primary importance that further exploration should start soon.

74. Although most experts are confident that additional low-cost uranium resources still exist, intensive work, involving the employment of the most sophisticated techniques and considerable financial expenditure will have to be carried out quickly in order to discover, evaluate and convert them into ore reserves for mining purposes. Exploration will probably be based on preliminary geological favourability studies at regional and local levels and involve the use of such techniques as airborne and car-borne radiometric surveys. In such surveys both total counter scintillometers and the newer discrimination techniques, utilizing gamma-ray spectrometers, might be used. Other ground survey methods, involving the use of gammameters, scintillometers, gamma-ray spectrometers, ground radon monitors and geochemical techniques are likely to be employed. During 1968, exploration did in fact increase markedly in many countries, and considerable work was also done in the development of new exploration techniques and new types of prospecting instruments.

75. In addition to low-cost uranium reserves, substantial reserves of higher-cost ore are known to exist. The techniques for the economic extraction of uranium from this ore must be improved and, towards this end, research on uranium-ore processing methods and the recovery of uranium from low-grade ore has continued. Technical assistance has been provided to developing countries to help them to carry out all activities relating to uranium exploration, evaluation and ore processing. In one country expert advice was provided and an exploration programme was developed, with useful results. An Agency staff member visited two countries and advised them on the formulation of exploration programmes. Inquiries were received from a number of other countries about the possibilities of obtaining technical assistance and advice in setting up uranium exploration and development programmes.

(iii) Nuclear instrumentation in prospection and analysis

76. One of the most valuable assets of a country is its mineral resources, and extensive efforts are being made throughout the world, particularly in developing countries, to evaluate them. The conditions which exist in the field during preliminary exploration and detailed local surveys on the surface and in boreholes make it very difficult to carry out accurate analyses. Nuclear techniques have already proved to be one of the most useful methods of evaluation, as they can be used under these conditions as well as under laboratory conditions, and the variety and precision of these techniques are rapidly increasing. The commercial availability of portable X-ray fluorescence analysers has proved to be a great advantage, since they permit rapid, on-the-spot mineral analyses to be carried out, thereby minimizing the need for time-consuming wet-chemistry analyses. The Agency has provided equipment of this type, together with experts, to five countries to assist in evaluating their mineral deposits, and the number of other requests for such assistance shows the increased interest in this subject.

77. The ability to perform qualitative and quantitative analyses in boreholes obviously increases the efficiency of exploration operations; nuclear techniques, particularly selective gamma-gamma logging and activation analysis, are making this possible. Geochemical and geobotanical prospecting, involving neutron activation analysis, is a sensitive and fast method of assessing mineral reserves, and assistance in this work has been given to two countries.

78. Regional advisers on the industrial application of radioisotopes in Latin America and in Asia and the Far East visited a total of 27 countries to assist in assessing the potential use of nuclear techniques. Experts and equipment were also provided to assist, for example, with gamma-radiography (two experts), the engineering applications of radioisotopes (two experts), and general industrial applications (five experts).

(e) Nuclear power

79. With the rapid progress in the use of nuclear power, an increasing number of developing countries is taking an active interest in its use for generating electricity and desalting water. The Agency has received numerous requests for technical advice and assistance dealing with subjects ranging from overall national programmes for the



development of nuclear power to specific nuclear projects. These requests were met by sending experts recruited from outside and using staff advisory services, as appropriate. Some examples of the Agency's activities in relation to developing countries are given below.

80. The introduction of nuclear power into developing countries requires - among other things - close co-operation between the power and water planning authorities, public utilities and national atomic energy commissions. The Agency has been emphasizing the importance of adequate co-ordination at the national level. In this connection, the Agency co-sponsored with ECAFE a briefing seminar on nuclear power for senior power planners, public utility executives and technical specialists participating in the 11th session of the Committee on Energy Resources and Electric Power held in Singapore in June 1968. The seminar, which was attended by 66 participants and observers from 19 countries in the region, concluded that the stage had been reached when it would be advantageous for the developing countries in the region to give serious consideration to the use of nuclear power in their power development programmes. It provided the latest technical and cost information on the competitive position of nuclear power and acquainted the participants with the problems involved in developing and implementing nuclear power programmes.

81. Brazil, which has been developing its short-term and long-term nuclear power programme, submitted a request for assistance. The Agency sent a team of six experts, including a staff member, to work with a group of Brazilian specialists in reviewing and elaborating a programme for the development of nuclear power in South and Central Brazil. The experts stayed for periods ranging from 2 to 12 weeks and indicated in their report that the large-scale introduction of nuclear power in the area could be justified by the early 1980's, and that the first nuclear power project could be undertaken by the late 1970's. A detailed plan of action, covering the preparatory steps needed and the time-table for implementing the programme, was determined. The recommendations covered such subjects as long-term applied research and development for nuclear power production (including exploitation of local thorium resources), the co-ordination of technical work at the three major nuclear energy institutes, the development of a comprehensive programme of education and training, the role of Brazilian industry and collaboration between authorities dealing with power, atomic energy, resources and economic planning. With the agreement of the Brazilian Government, copies of the report are being made available to interested countries.

82. The Republic of Korea has just announced its first nuclear power project. Towards the end of 1968 the Agency sent a staff member for two weeks to discuss with the Korean authorities the results and the recommendations arising out of a feasibility study by an engineering consulting firm and to advise on the follow-up of this study and the preparatory steps needed for the implementation of the project, with particular reference to the considerations to be kept in mind when evaluating proposals, and on the assessment of the staffing requirements and training of technical personnel.

83. Greece is actively planning its first nuclear power project. Two staff members were sent to advise the Greek Atomic Energy Commission on the planning of the project, the preparation of basic specifications, training, fuel supply and the management and regulatory aspects of nuclear power. A series of lectures was delivered to technical and managerial staff from the Commission and the major public utility.

84. Some developing countries are showing keen interest in nuclear desalting and agro-industrial complexes. With regard to a recently completed three-year Mexico/US/IAEA study on the use of large nuclear desalting plants to meet the water and power requirements of the south-western part of the United States and the north-western part of Mexico, the Agency provided a staff member to act as the scientific secretary for the joint study group. The Agency has co-operated in the study of agro-industrial complexes for Africa and the Middle East being conducted by the Oak Ridge National Laboratory by sending two staff members along with the United States team to the countries concerned in the area; these studies are still in progress.

(f) Fellowships

85. Evaluation of the Agency's fellowship programme is carried out on a continuing basis by analysing reports and questionnaires which the Agency asks fellows to submit after their training is completed. The latest analysis covers fellows who completed training during the period 1 July 1965 - 31 December 1967; the results of an earlier analysis were reported in 1966[ 8 ].

86. During the period surveyed, 579 fellows completed training and, by 31 December 1968, 440 or 77% had responded to the Agency's request for information on the results of their training. An analysis of the information showed that 94.5% had gone back to their home countries upon completion of their fellowships. Seventy-five per cent reported that their current work was closely related to the training they had received, and an additional 21% found their training was being partially utilized. Thus, less than 4% considered that their work was unrelated to their training, and even in some of these cases it was expected that the training would be made use of in the future. Of the 5.5% who had not returned home after completing their training, it was found that most had remained abroad to continue studying under the sponsorship of other bodies. Less than 1% of the total number of fellows involved had accepted employment abroad or showed no intention of returning for other reasons.

87. The foregoing findings closely parallel the results of the earlier analysis reported in 1966. The two analyses provide data which show that, from the start of the fellowship programme in 1958 to 31 December 1967, 2067 fellows had completed training[ 9 ]. Questionnaires returned by 1752 of these fellows (85%) show that 1663 or 94.8% had returned to their home countries on completing their training, 68 or 3.9% had remained abroad for further study, and 21 or 1.2% had accepted employment abroad or showed no intention of returning for other reasons. It is most gratifying to the Agency, and should be a source of satisfaction to all Member States, that the fellowship programme has contributed so little to the "brain drain", which is the subject of such serious concern to developing and developed countries alike. ..

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[ 8 ] See document GC(X)/INF/87, paras 92 and 93.

[ 9 ] The figure of 2067 includes 143 fellows trained prior to 1 July 1965, whose questionnaires were returned too late for inclusion in the analysis reported in 1966. The information given in these questionnaires shows that the percentage of fellows remaining abroad and their reasons for doing so were substantially the same as in the case of the first analysis.

### Part III. CONCLUSIONS

88. The value of requests received for experts and equipment under the Agency's regular programme of technical assistance had increased from some \$700 000 in 1959 to \$3.7 million in 1969. The percentage of requests that could be met during this period fell from 89.6% to 26.4%, that is, only one in four of all requests for experts' services and equipment can now be met. In reality the position is worse, since many Governments no longer submit requests covering all their needs to the Agency because they are aware that there is no possibility of their being met. Of the many requests which cannot be met for lack of funds a few may be partially met by Governments and some are re-submitted for consideration under the subsequent year's programme, but the remainder cannot be met at all.

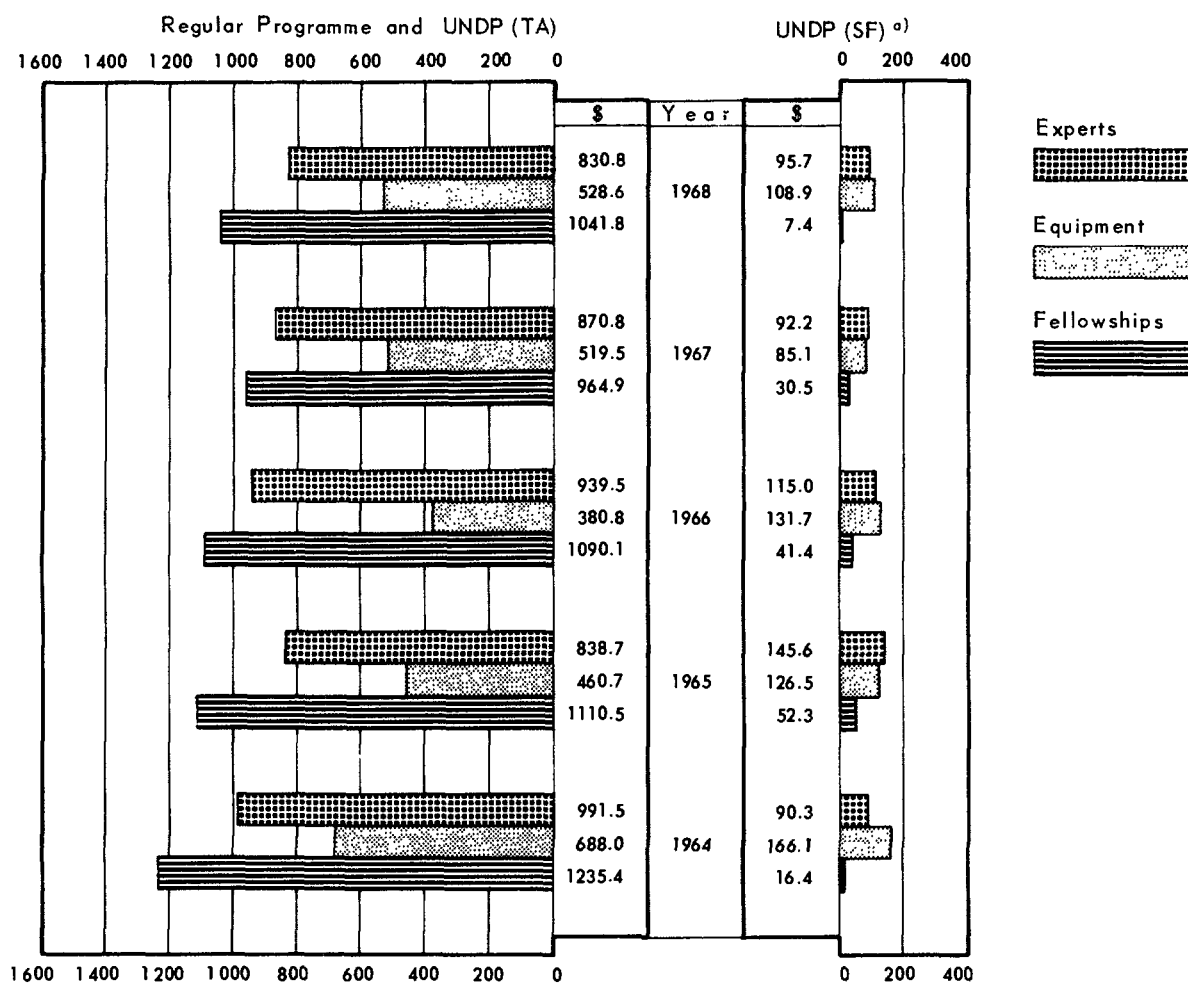
89. The inadequacy of financial resources continues to cause great concern. The target figure for voluntary contributions to the General Fund has remained at \$2 million since 1962 and, on an average, only 69% of this figure has been reached. Furthermore, the constant increase in prices has caused a decline in the real value of the technical assistance provided, as compared with its value in 1962; this decline was estimated to be about \$300 000 in respect of 1968.

90. The two main sources of funds are the voluntary contributions to the General Fund and the financial support provided by UNDP(TA). Experience has shown that, bearing in mind the relatively short-term nature of most Agency projects and the fact that UNDP(TA) funds are almost entirely devoted to the long-term, continuing projects of all the United Nations organizations, it is desirable to utilize the very limited regular programme resources as "seed money", that is, to start programmes in Member States, particularly in those which have recently become Members of the Agency, or to implement short-term projects under existing programmes in other countries. The UNDP(TA) country programme is based entirely on programmes submitted by national planning authorities. An analysis shows that, whereas in 1967 UNDP(TA) financed 30% of the assistance provided by the Agency in support of country programmes, this had risen to 33% in 1968. Under the system of continuous programming adopted by UNDP(TA), national atomic energy authorities will have to exercise vigilance and persistence to ensure that their projects receive the necessary priority from the governmental co-ordinating authorities and thus obtain UNDP(TA) support; this applies, in particular, to projects started under the regular programme which need to be continued for some years.

91. The target for voluntary contributions to the General Fund would be met if Member States responded to the invitation of the General Conference in Resolution GC(V)/RES/100 to make such contributions "... in amounts that are at least the same percentages of the target for each year as are their assessed contributions to the Regular Budget", and it would then be possible to meet a larger percentage of the requests which are technically sound and economically viable than is now the case.

FIGURE 8

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



a) The UNDP (SF) figures given here do not reflect expenditures on sub-contracts and miscellaneous project costs, which include "experts" and "equipment"; these amounted to an additional \$21 400 in 1963-64, \$372 100 in 1965-66 and \$205 500 in 1967-68

# A N N E X I

## STATISTICAL TABLES

### Introductory Notes

#### General

1. Beginning with the report on the technical assistance provided by the Agency in 1964[1], an attempt to make the Agency's technical assistance programme easier to review was made by providing financial data on unliquidated obligations at the end of each year, itemized by source (EPTA or UNDP(TA) and Agency funds) and recipient (individual countries and international projects); a clearer picture was thus given of the funds spent, those committed and those still available.

2. Some further refinements have now been made in the presentation of the financial statistics in order to reflect more accurately the actual situation, as explained in paragraphs 3, 6 and 7 below.

#### Resources

3. Fig.1 and Table 1 show only the resources made available for approved field programmes of technical assistance and do not include EPTA or UNDP(TA) overhead cost allocations. In addition, data in respect of offers of assistance in kind have been up-dated to 31 December 1968, the estimated value of Type II fellowship offers has been changed to reflect the resources that were available when the fellowships were awarded, and it was also adjusted, where necessary, at the time the fellows were placed. The estimated value of all offers of assistance in kind in support of a given year's technical assistance programme is shown in columns (1b) and (2b) of Table 1.

4. All monetary values appearing under the headings "in kind", or "free experts" or "Type II fellowships" 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 recipient country is based on the costs incurred); and
- (c) Fellowships. The value of Type II fellowships is estimated on the basis of the monthly 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.

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

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[ 1 ] GC(IX)/INF/80.

## Assistance provided

5. In Tables 4, 5, 7 and 8, the assistance provided by the Agency (experts, equipment and fellowships) includes actual cash payments against 1968 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 1968 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 1968 and prior years is given at the bottom of this column in Tables 4, 7 and 8.

6. 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.

7. Some corrections have also been made in the financial statistics relating to 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.

## Types of assistance

8. (a) Experts. When not shown separately, the assignments of visiting professors are included under the heading "Experts". With regard to Table 6, it should be noted that under "International projects" 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 programmes and international projects; and
- (c) Fellowships. In Table 3, where awards are classified by place of study, new 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(TA) country, Agency Type I and Type II awards shown in Tables 3 and 6 constitute the total effective awards as of 31 December 1968 (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(TA)" and "Agency Type I" (in Table 5 under "Number of fellowships"), and are financed either by UNDP(TA) or the Agency, they are not in the same category as Type I, Type II or the UNDP(TA) country awards. On the other hand, in Tables 7 and 8 the expenditure on regional advisers, short-term training projects and study at the Trieste Centre is not shown as assistance to individual countries but is given under "International projects". It will be noted that the total assistance provided in respect of "International projects" in Tables 7 and 8 corresponds to the relevant totals under "Short-term training projects" in Table 4. None of the tables includes any reference to local participants in short-term training projects.

### International projects

9. In the broadest sense, this heading covers regional projects for which experts' services only were provided (e. g., the regional advisers on industrial applications of isotopes and radiation), regional and inter-regional projects for which experts, equipment and fellowships were provided (short-term training projects) and regional and inter-regional projects for which fellowships only were provided (e. g., at the Trieste Centre). In Tables 7 and 8 only the expenditure on regional advisers, training at the Trieste Centre and short-term training projects is given under "International projects".

10. In 1968, 12 fellowships were awarded for study at the Trieste Centre. The total cost of fellowship training at the Centre in 1968 amounted to \$40 400. However, as \$35 000 transferred from Operating Fund II to Operating Fund I was used to meet part of these costs, it is not possible to specify from which of these two funds individual fellowships at the Centre were financed.

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

11. Although these are mentioned in the report as part of the Agency's technical co-operation activities, none of the statistical tables includes data relating to UNDP(SF) activities or projects carried out under funds-in-trust arrangements.

### Figures and percentages

12. 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  
Resources available: 1959-1968  
 (in thousands of dollars)

Year	UNDP(TA)		Agency		Sub-totals		Total
	Monetary (1a)	In kind <sup>a/</sup> (1b)	Monetary (2a)	In kind <sup>a/</sup> (2b)	UNDP(TA) (3)	Agency (4)	(3) + (4) (5)
1959	304	1	875	448	305	1323	1628
1960	633	1	1008	884	634	1892	2526
1961	786	1	981	518	787	1499	2286
1962	828	-	1146	588	828	1734	2562
1963	954	-	1230	484	954	1714	2668
1964	946	5	1115	613	951	1728	2679
1965	901	8	1200	503	909	1703	2612
1966	893	-	1263	518	893	1781	2674
1967	1076	3	1380	564	1079	1944	3023
1968	1134	5	1348	609	1139	1957	3096
1959- 1968	8455	24	11546	5729	8479	17275	25754

a/ Estimated - see Introductory Notes, paras 3 and 4 to this Annex.

Table 2  
Agency funds for technical assistance 1959-1968  
 (in thousands of dollars)

Item	1959-1964	1965	1966	1967	1968	1959-1968
Target for voluntary contributions to the General Fund <sup>a/</sup>	10 800	2 000	2 000	2 000	2 000	18 800
Budgeted for technical assistance	8 932	1 749	1 777	1 876	1 878	16 212
Amount pledged <sup>a/</sup>	7 636	1 331	1 256	1 432	1 366	13 021
Actually made available for technical assistance from the General Fund and Operating Fund II	6 355	1 200	1 263	1 380	1 348	11 546

a/ The use of funds from voluntary contributions is not restricted to technical assistance activities but also covers other operations of the Agency like the Monaco and Seibersdorf laboratories, the Trieste Centre and, up to 1967, research contracts.



Table 3

Experts in the field, classified by nationality, and fellowship awards,  
classified by place of study: 1968

Country of origin of experts or place of study	Experts					Fellowship awards						Total
	UNDP(TA)		Agency		Total	UNDP(TA)		Agency			Scientific visits	
	Paid	Free	Paid	Free		Country	Regional	Type I	Type II	Regional		
Argentina	4	-	4	-	8	-	-	-	3	-	-	3
Australia	1	-	-	-	1	2	-	1	-	-	-	3
Austria	3	-	3	-	6	-	-	-	2	-	-	2
Belgium	1	-	-	1	2	1	-	3	6	-	1	11
Brazil	-	-	-	-	-	-	8	-	1	-	-	9
Canada	5	-	1	-	6	3	-	4	-	-	-	7
Ceylon	1	-	-	-	1	-	-	-	-	-	-	-
Costa Rica	-	-	-	-	-	-	-	-	-	-	1	1
CSSR	8	-	7	-	15	-	14	-	-	-	-	14
Denmark	3	-	1	-	4	-	-	-	5	-	4	9
Finland	-	-	2	-	2	-	-	-	-	-	-	-
France	1	-	2	1	4	2	-	19	-	-	3	24
Germany, F.R.	3	-	5	1	9	1	-	6	15	19	4	45
Hungary	1	-	1	-	2	-	-	-	2	-	-	2
Iceland	-	-	-	-	-	-	-	5	-	-	-	5
India	6	-	4	-	10	-	-	-	12	-	-	12
Iran	1	-	-	-	1	-	-	-	-	-	-	-
Iraq	2	-	-	-	2	-	-	-	-	-	-	-
Israel	2	-	1	-	3	-	-	-	1	-	-	1
Italy	4	-	2	-	6	-	16	1	17	-	1	35
Japan	-	-	1	-	1	2	-	4	8	-	-	14
Korea, R.	-	-	1	-	1	-	-	-	-	-	-	-
Mexico	-	-	-	-	-	-	-	-	1	-	-	1
Netherlands	2	-	2	-	4	3	-	2	5	-	2	12
New Zealand	-	-	1	-	1	-	-	-	-	-	-	-
Nigeria	-	-	1	-	1	-	-	-	-	-	-	-
Norway	1	-	1	-	2	-	-	1	-	-	-	1
Philippines	1	-	-	-	1	-	-	-	-	-	-	-
Poland	4	-	1	-	5	-	14	-	6	-	-	20
Romania	-	-	1	-	1	-	13	-	-	-	-	13
Spain	2	-	1	-	3	-	-	-	6	-	1	7
Sweden	4	-	1	-	5	5	-	4	1	-	3	13
Switzerland	-	-	-	-	-	1	-	-	1	-	1	3
Turkey	-	-	1	-	1	-	-	-	-	-	-	-
UAR	-	-	1	-	1	-	-	-	-	-	-	-
United Kingdom	18	-	10	2	30	6	-	35	-	14	5	60
USA	17	1	16	1	35	15	-	11	45	-	-	71
USSR	3	-	-	-	3	-	24	-	9	-	-	33
Venezuela	1	-	-	-	1	-	-	-	-	-	-	-
Yugoslavia	3	-	4	-	7	-	-	-	3	-	-	3
Sub-total	102	1	76	6	185	41	89	96	149	33	26	434
IAEA, Austria	-	-	-	-	-	3	-	11	-	21	4	39
IAEA, Monaco Laboratory	-	-	-	-	-	1	-	-	-	-	-	1
IAEA, Trieste Centre	-	-	-	-	-	1	-	11	-	-	-	12
IPA Neutron Crystal Spectrometer Project	-	-	-	-	-	1	-	-	-	-	-	1
Joint Institute for Nuclear Research, Dubna, USSR	-	-	-	-	-	-	-	-	1	-	-	1
Middle Eastern Regional Radioisotope Centre for the Arab Countries	-	-	-	-	-	-	17	1	-	-	-	18
NPY/NORA Reactor Physics Project	-	-	-	-	-	-	-	2	-	-	-	2
SGAE/ENEA/IAEA Irradiation of Fruit/Fruit Juices Project	-	-	-	-	-	-	-	1	-	-	-	1
Uppsala International Seminar, Sweden	-	-	-	-	-	-	-	1	-	-	-	1
Sub-total	-	-	-	-	-	6	17	27	1	21	4	76
Total	102	1	76	6	185	47	106	123	150	54	30	510 <sup>a/</sup>

<sup>a/</sup> The difference between the number of awards (456) and the number of places of study (510) is due to the fact that five fellows each studied in two countries (one UNDP(TA) country award, two Type I and two Type II fellowship awards), the 14 study tour participants visited three countries (UNDP(TA) regional awards) and the nine holders of scientific visit awards went to 30 places of study.

B. DISTRIBUTION OF TECHNICAL ASSISTANCE

Table 4

Types of technical assistance: 1959-1968<sup>a/</sup>

(in thousands of dollars)

YEAR Type of resource	Experts		Visiting professors		Equipment		Fellowships		Research fellowships		Short-term training projects		Mobile radioisotope laboratory		TOTAL		Assistance outstanding		TOTAL (8)+(9)+(10) \$
															Unliquidated obligations	In kind balance <sup>b/</sup>	(11)		
															at 31 December 1968				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)									
\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	\$				
1959-1964																			
EPTA	1462.9	41.0	-	-	618.9	17.4	945.9	26.5	-	-	535.8	15.0	2.2	0.1	3 565.7	100.0	-	-	3 565.7
Agency monetary Assistance in kind <sup>b/</sup>	1403.0	27.5	453.1	8.9	731.9	14.3	2046.3	40.1	85.3	1.7	286.4	5.6	100.4	1.9	5 106.4	100.0	24.0	-	5 130.4
	97.6	3.0	-	-	426.3	13.1	2723.0	83.4	-	-	2.1	0.1	13.8	0.4	3 262.8	100.0	-	50.5	3 313.3
TOTAL	2963.5	24.8	453.1	3.8	1777.1	14.9	5715.2	47.9	85.3	0.7	824.3	6.9	116.4	1.0	11 934.9	100.0	24.0	50.5	12 009.4
1965																			
EPTA	272.0	41.9	-	-	150.6	23.2	91.4	14.1	-	-	135.1	20.8	-	-	649.1	100.0	-	-	649.1
Agency monetary Assistance in kind <sup>b/</sup>	345.6	28.7	117.3	9.7	207.9	17.2	398.6	33.0	31.1	2.6	84.1	7.0	21.3	1.8	1 205.9	100.0	12.0	-	1 217.9
	23.5	4.2	-	-	39.9	7.2	491.5	88.6	-	-	-	-	-	-	554.9	100.0	-	12.8	567.7
TOTAL	641.1	26.6	117.3	4.9	398.4	16.5	981.5	40.7	31.1	1.3	219.2	9.1	21.3	0.9	2 409.9	100.0	12.0	12.8	2 434.7
1966																			
UNDP(TA)	354.0	42.7	-	-	195.8	23.6	97.1	11.7	-	-	181.8	22.0	-	-	828.7	100.0	14.5	-	843.2
Agency monetary Assistance in kind <sup>b/</sup>	359.0	36.0	106.4	10.7	115.9	11.6	279.1	28.0	23.4	2.4	112.6	11.3	0.2	-	996.6	100.0	16.2	-	1 012.8
	9.9	1.7	-	-	36.7	6.3	529.0	90.4	-	-	9.5	1.6	-	-	585.1	100.0	-	5.3	590.4
TOTAL	722.9	30.0	106.4	4.4	348.4	14.5	905.2	37.5	23.4	1.0	303.9	12.6	0.2	0.0	2 410.4	100.0	30.7	5.3	2 446.4
1967																			
UNDP(TA)	337.0	42.0	-	-	174.5	21.8	123.2	15.4	-	-	166.8	20.8	-	-	801.5	100.0	36.7	-	838.2
Agency monetary Assistance in kind <sup>b/</sup>	345.4	34.7	90.4	-	220.4	22.2	232.5	23.4	19.3	1.9	86.6	8.7	-	-	994.6	100.0	213.1	-	1 207.7
	1.6	0.3	-	-	75.1	13.4	479.1	85.7	-	-	3.3	0.6	-	-	559.1	100.0	-	74.8	633.9
TOTAL	684.0	29.0	90.4	3.8	470.0	20.0	834.8	35.5	19.3	0.8	256.7	10.9	-	-	2 355.2	100.0	249.8	74.8	2 679.8
1968																			
UNDP(TA)	378.9	42.8	-	-	224.2	25.3	96.8	11.0	-	-	184.9	20.9	-	-	884.8	100.0	951.9	-	1 836.7
Agency monetary Assistance in kind <sup>b/</sup>	304.4	31.9	34.0	3.6	209.6	22.0	308.8	32.4	14.1	1.5	82.1	8.6	-	-	953.0	100.0	606.0	-	1 559.0
	0.6	0.1	-	-	73.2	13.0	478.8	85.0	-	-	10.8	1.9	-	-	563.4	100.0	-	516.9	1 080.3
TOTAL	683.9 <sup>c/</sup>	28.5	34.0	1.4	507.0	21.1	884.4	36.8	14.1	0.6	277.8	11.6	-	-	2 401.2	100.0	1557.9	516.9	4 476.0
1959-1968																			
EPTA-UNDP(TA)	2804.8	41.7	-	-	1364.0	20.3	1354.4	20.1	-	-	1204.4	17.9	2.2	-	6 729.8	100.0	1003.1	-	7 732.9
Agency monetary Assistance in kind <sup>b/</sup>	2757.4	29.8	801.2	8.7	1485.7	16.0	3265.3	35.3	173.2	1.9	651.8	7.0	121.9	1.3	9 256.5	100.0	871.3	-	10 127.8
	133.2	2.4	-	-	651.2	11.8	4701.4	85.1	-	-	25.7	0.5	13.8	0.2	5 525.3	100.0	-	660.3	6 185.6
TOTAL	5695.4	26.5	801.2	3.7	3500.9	16.3	9321.1	43.3	173.2	0.8	1881.9	8.8	137.9	0.6	21 511.6	100.0	1874.4	660.3	24 046.3

a/ Data as at 31 December 1968.

b/ Estimated - see Introductory Notes paras 6 and 7 to this Annex.

c/ The 1968 figures for "Experts" include miscellaneous and bank charges amounting to \$4500 under UNDP(TA) and \$5000 under "Agency monetary".

Table 5

Fields of activity of technical assistance: 1968

Field	Number of expert assignments	Cost of equipment (in thousands of dollars)	Number of fellowships <sup>a/</sup>
General atomic energy development	23	19.4	25
Nuclear physics	14	52.9	63
Nuclear chemistry	12	46.7	34
Prospecting, mining and processing of nuclear materials	3	9.6	17
Nuclear engineering and technology	24	50.3	81
Application of isotopes and radiation in agriculture	42	99.6	79
Application of isotopes and radiation in medicine	29	60.0	66
Application of isotopes and radiation in biology	1	17.8	18
Other fields of application of isotopes and radiation	18	94.8	30
Safety in nuclear energy	23	77.5	43
TOTAL	189 <sup>b/</sup>	528.6	456

<sup>a/</sup> These figures include 132 participants in ten regional and inter-regional training projects and nine holders of awards for scientific visits.

<sup>b/</sup> The difference between the number of assignments (189) and the actual number of experts (185) is due to the fact that each of four experts served in two countries.

Table 6

Recipients of experts and fellowship awards: 1968

RECIPIENT	Number of experts classified by place of assignment								Number of fellowships classified by nationality of recipient									
	UNDP(TA)				Agency				Total	UNDP(TA)				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)		
<u>Country programmes</u>																		
Algeria	1	6	-	-	-	-	-	-	1	6	-	-	1	7	-	-	1	7
Argentina	5	13	-	-	3	6	-	-	8	19	-	-	6	48	5	44	11	92
Austria	-	-	-	-	-	-	-	-	-	-	-	-	1	10	-	-	1	10
Bolivia	1	6	-	-	1	1	-	-	2	7	-	-	2	20	1	6	3	26
Brazil	8	21	-	-	2	9	-	-	10	30	3	36	2	20	5	58	10	114
Bulgaria	-	-	-	-	-	-	-	-	-	-	2	12	5	48	3	32	10	92
Burma	3	15	-	-	-	-	-	-	3	15	3	36	3	24	1	12	7	72
Cambodia	-	-	-	-	1	5	-	-	1	5	-	-	-	-	-	-	-	-
Ceylon	1	6	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-
Chile	1	3	-	-	4	17	-	-	5	20	4	42	2	12	1	12	7	66
China	3	13	-	-	2	9	-	-	5	22	2	18	6	43	6	69	14	130
Colombia	-	-	-	-	1	1	-	-	1	1	-	-	-	-	3	30	3	30
Congo, D. R.	-	-	-	-	1	2	-	-	1	2	-	-	2	18	2	15	4	33
Costa Rica	-	-	-	-	1	3	-	-	1	3	-	-	-	-	-	-	-	-
Cuba	-	-	-	-	1	2	-	-	1	2	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	1	1	-	-	1	1	1	3	-	-	1	6	2	9
CSSR	-	-	-	-	-	-	-	-	-	-	-	-	3	22	4	40	7	62
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	18	2	18
El Salvador	-	-	-	-	1	3	-	-	1	3	-	-	-	-	-	-	-	-
Ethiopia	-	-	-	-	-	-	-	-	-	-	-	-	1	10	1	12	2	22
Ghana	-	-	-	-	1	12	-	-	1	12	-	-	-	-	-	-	1	10
Greece	4	18	-	-	1	6	-	-	5	24	-	-	4	33	6	57	10	90
Guatemala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Hungary	-	-	-	-	-	-	-	-	-	-	1	6	5	50	6	58	12	114
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1	2
India	-	-	-	-	2	3	-	-	2	3	4	40	6	57	7	74	17	171
Indonesia	1	4	-	-	1	6	-	-	2	10	3	27	2	18	6	60	11	105
Iran	3	18	-	-	2	7	-	-	5	25	-	-	-	-	3	30	3	30
Iraq	3	22	-	-	1	1	-	-	4	23	-	-	5	47	10	101	15	148
Israel	-	-	-	-	2	4	-	-	2	4	-	-	-	-	-	-	-	-
Jamaica	1	1	-	-	1	1	-	-	2	2	-	-	-	-	-	-	-	-
Kenya	1	1	-	-	1	1	-	-	2	2	-	-	2	11	-	-	2	11
Korea, R	-	-	-	-	1	4	-	-	1	4	-	-	2	16	9	102	11	118
Lebanon	-	-	-	-	1	1	-	-	1	1	-	-	2	12	-	-	2	12
Mexico	3	7	-	-	1	4	-	-	4	11	-	-	2	20	4	32	6	52

Morocco	-	-	-	-	-	-	-	-	-	-	2	14	-	-	2	14		
Pakistan	1	12	-	-	2	3	-	-	3	15	1	12	4	28	7	71	12	111
Panama	-	-	-	-	-	-	-	-	-	-	1	7	-	-	-	-	1	7
Paraguay	-	-	-	-	-	-	-	-	-	-	-	-	1	3	1	3	1	3
Peru	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	1	6
Philippines	1	2	-	-	1	7	-	-	2	9	3	36	4	29	11	100	18	165
Poland	-	-	-	-	-	-	-	-	-	-	1	12	4	42	7	76	12	130
Romania	1	1	-	-	-	-	-	-	1	1	1	6	5	52	4	28	10	86
Saudi Arabia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	12
Senegal	-	-	-	-	2	14	-	-	2	14	-	-	1	6	-	-	1	6
Sierra Leone	-	-	-	-	1	3	-	-	1	3	-	-	-	-	-	-	-	-
Singapore	-	-	-	-	1	4	-	-	1	4	-	-	1	3	-	-	1	3
Spain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	12	2	12
Sudan	-	-	-	-	1	12	-	-	1	12	-	-	4	36	-	-	4	36
Syria	1	2	-	-	-	-	-	-	1	2	3	25	-	-	-	-	3	25
Thailand	2	1	-	-	2	6	-	-	4	7	2	24	5	52	9	88	16	164
Tunisia	1	12	-	-	-	-	-	-	1	12	-	-	5	54	-	-	5	54
Turkey	2	11	-	-	3	11	-	-	5	22	2	24	5	50 <sup>a/</sup>	6	60	13	134
Uganda	1	1	-	-	1	3	-	-	2	4	-	-	-	-	-	-	-	-
UAR	2	5	-	-	3	8	-	-	5	13	1	6	2	13	10	106	13	125
Uruguay	-	-	-	-	2	4	-	-	2	4	-	-	-	-	-	-	-	-
Venezuela	-	-	-	-	1	6	-	-	1	6	-	-	3	27	-	-	3	27
Viet-Nam	1	3	-	-	-	-	-	-	1	3	-	-	1	12	1	12	2	24
Yugoslavia	9	8	-	-	1	2	-	-	10	10	8	47	8	83	2	24	18	154
Sub-total	61	212	-	-	55	192	-	-	116	404	46	418	121	1066	148	1472	315	2956

International projects

Africa	1	6	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-
Americas	2	5	-	-	-	-	-	-	2	5	-	-	-	-	-	-	-	-
Asia and the Far East	4	15	-	-	-	-	-	-	4	15	-	-	-	-	-	-	-	-
Short-term training projects	36	22	1	1	23	9	6	1	66	33	78	163	54	91	-	-	132	254
Scientific visits	-	-	-	-	-	-	-	-	-	-	-	-	9	15	-	-	9	15
Sub-total	43	48	1	1	23	9	6	1	73	59	78	163	63	106	-	-	141	269
GRAND TOTAL	104	260	1	1	78	201	6	1	189 <sup>b/</sup>	463	124	581	184	1172	148	1472	456	3225

(1) Number.

(2) Number of man-months.

a/ One 11-month award was financed from two sources (8 months under Type II, 3 months under Type I fellowships); the award is shown under "Type II".

b/ The difference between the number of assignments (189) and the actual number of experts (185) is due to the fact that each of four experts served in two countries.

Table 7

## Financial summary: 1968

(in thousands of dollars)

RECIPIENT	Expenditures and assistance provided in kind <sup>a/</sup>									Assistance outstanding		
	Type				Source					Unliquidated obligations at 31 December 1968	In kind <sup>a/</sup> balance	TOTAL (8) + (9) + (10)
	Experts	Equip-ment	Fellow-ships	TOTAL	UNDP(TA)		Agency		TOTAL			
					Monetary (5a)	In kind <sup>a/</sup> (5b)	Monetary (6)	In kind <sup>a/</sup> (7)		(8)	(9)	(10)
<u>Country programmes</u>												
Afghanistan	-	(0.8)	3.0	2.2	-	-	(0.8)	3.0	2.2	-	3.1	5.3
Albania	-	-	1.5	1.5	-	-	-	1.5	1.5	-	3.9	5.4
Algeria	10.3	-	3.9	14.2	10.3	-	0.1	3.8	14.2	2.0	-	16.2
Argentina	32.7	54.7	28.4	115.8	70.9	0.6	19.5	24.8	115.8	47.7	13.9	177.4
Austria	-	-	3.0	3.0	-	-	3.0	-	3.0	5.5	-	8.5
Bolivia	9.7	6.9	6.9	23.5	8.1	-	11.1	4.3	23.5	36.3	7.5	67.3
Brazil	60.8	9.2	54.3	124.3	63.9	-	22.6	37.8	124.3	46.8	64.1	235.2
Bulgaria	-	1.0	25.1	26.1	0.5	-	21.6	4.0	26.1	36.0	18.5	80.6
Burma	24.1	9.6	4.4	38.1	32.8	-	5.3	-	38.1	82.6	2.4	123.1
Cambodia	7.5	11.4	-	18.9	-	-	18.9	-	18.9	2.5	-	21.4
Cameroon	0.6	-	-	0.6	0.6	-	-	-	0.6	14.9	-	15.5
Ceylon	9.8	0.2	-	10.0	7.6	-	2.4	-	10.0	8.8	-	18.8
Chile	34.3	24.9	4.6	63.8	13.2	-	40.4	10.2	63.8	55.8	9.5	129.1
China	40.0	23.6	44.1	107.7	46.5	-	37.8	23.4	107.7	68.1	30.3	206.1
Colombia	3.6	14.7	15.2	33.5	2.6	-	7.7	23.2	33.5	32.4	25.8	91.7
Congo, D. R.	2.6	4.5	6.7	13.8	-	-	11.5	2.3	13.8	9.3	10.6	33.7
Costa Rica	5.6	10.7	-	16.3	-	-	5.6	10.7	16.3	-	-	16.3
Cuba	3.5	4.2	-	7.7	-	-	7.7	-	7.7	9.0	-	16.7
Cyprus	2.4	-	-	2.4	-	-	2.4	-	2.4	1.2	0.8	4.4
CSSR	-	-	19.1	19.1	-	-	2.3	16.8	19.1	8.2	11.3	38.6
Ecuador	-	11.2	(0.3)	10.9	3.5	-	7.4	-	10.9	18.3	4.1	33.3
El Salvador	4.6	2.0	-	6.6	-	-	4.6	2.0	6.6	4.6	-	11.2
Ethiopia	-	0.1	1.3	1.4	-	-	1.4	-	1.4	2.4	7.0	10.8
Ghana	18.2	8.1	7.7	34.0	3.9	-	22.4	7.7	34.0	6.3	1.2	41.5
Greece	46.8	-	15.7	62.5	35.0	-	20.0	7.5	62.5	39.8	23.7	126.0
Guatemala	-	0.4	6.7	7.1	0.4	-	-	6.7	7.1	21.8	1.7	30.6
Hong Kong	0.3	-	-	0.3	-	-	0.3	-	0.3	0.8	-	1.1
Hungary	-	3.1	32.8	35.9	3.9	-	20.2	11.8	35.9	54.4	20.3	110.6
Iceland	-	-	0.9	0.9	-	-	0.9	-	0.9	0.3	-	1.2
India	6.2	20.4	54.9	81.5	8.4	-	28.8	44.3	81.5	78.2	39.8	199.5
Indonesia	19.2	23.1	38.5	80.8	25.3	-	25.2	30.3	80.8	66.5	35.7	183.0
Iran	45.6	1.6	19.9	67.1	36.2	-	14.2	16.7	67.1	33.5	7.8	108.4
Iraq	34.1	2.1	19.7	55.9	34.5	-	14.4	7.0	55.9	86.7	31.7	174.3
Israel	7.4	4.1	2.3	13.8	0.5	-	13.3	-	13.8	29.7	-	43.5
Jamaica	5.5	-	-	5.5	-	-	5.5	-	5.5	10.9	-	16.4
Japan	-	-	1.5	1.5	-	-	1.5	-	1.5	0.1	-	1.6
Jordan	0.2	-	4.0	4.2	4.2	-	-	-	4.2	0.9	-	5.1
Kenya	0.9	0.5	2.1	3.5	0.5	-	3.0	-	3.5	15.5	-	19.0
Korea, R.	6.0	7.9	33.4	47.3	2.7	-	20.5	24.1	47.3	29.9	41.9	119.1
Lebanon	0.7	-	1.9	2.6	-	-	2.6	-	2.6	20.7	-	23.3
Mexico	24.0	14.3	9.2	47.5	18.5	-	22.0	7.0	47.5	109.0	5.3	161.8
Morocco	-	3.1	0.8	3.9	-	-	3.9	-	3.9	16.4	-	20.3
Nicaragua	-	0.3	-	0.3	-	-	0.3	-	0.3	5.9	-	6.2
Nigeria	-	-	9.0	9.0	1.7	-	2.0	5.3	9.0	22.7	16.5	48.2
Pakistan	24.2	22.6	50.6	97.4	34.7	-	23.4	39.3	97.4	41.1	29.6	168.1
Paraguay	-	-	0.4	0.4	-	-	-	0.4	0.4	-	1.7	2.1
Peru	0.2	-	-	0.2	1.0	-	(0.8)	-	0.2	20.5	-	20.7
Philippines	13.0	26.6	59.4	99.0	21.5	-	37.1	40.4	99.0	33.9	26.2	159.1
Poland	-	44.6	32.3	76.9	49.4	-	19.2	8.3	76.9	21.5	22.0	120.4
Portugal	2.5	-	-	2.5	-	-	2.5	-	2.5	0.4	-	2.9
Romania	3.8	27.5	36.7	68.0	17.6	-	35.3	15.1	68.0	20.8	11.1	99.9
Saudia Arabia	1.1	-	2.3	3.4	-	-	1.1	2.3	3.4	4.5	4.7	12.6
Senegal	25.1	6.4	0.9	32.4	-	-	32.4	-	32.4	3.5	-	35.9
Sierra Leone	5.9	-	-	5.9	-	-	5.9	-	5.9	15.8	-	21.7
Singapore	7.3	1.0	1.4	9.7	-	-	9.7	-	9.7	7.7	-	17.4
South Africa	-	-	1.1	1.1	-	-	-	1.1	1.1	-	-	1.1
Spain	-	-	-	-	-	-	-	-	-	-	3.6	3.6
Sudan	16.3	-	10.5	26.8	-	-	26.8	-	26.8	10.5	-	37.3
Syria	2.6	-	1.2	3.8	3.8	-	-	-	3.8	17.4	-	21.2
Thailand	12.4	16.8	65.5	94.7	12.0	-	36.5	46.2	94.7	87.3	38.2	220.2

RECIPIENT	Expenditures and assistance provided in kind <sup>a/</sup>									Assistance outstanding		
	Type				Source					Unliquidated obligations at 31 December 1968 (9)	In kind <sup>a/</sup> balance (10)	TOTAL (8) + (9) + (10) (11)
	Experts (1)	Equip-ment (2)	Fellow-ships (3)	TOTAL (4)	UNDP(TA)		Agency		TOTAL (8)			
					Monetary (5a)	In kind <sup>a/</sup> (5b)	Monetary (6)	In kind <sup>a/</sup> (7)				
Tunisia	23.8	2.4	16.4	42.6	24.4	-	15.5	2.7	42.6	30.8	1.7	75.1
Turkey	33.9	12.1	42.3	88.3	28.2	-	38.5	21.6	88.3	34.1	28.7	151.1
Uganda	9.3	5.6	-	14.9	6.2	-	8.7	-	14.9	45.1	-	60.0
UAR	20.1	19.0	30.5	69.6	17.1	-	38.5	14.0	69.6	64.8	36.9	171.3
Uruguay	7.4	25.9	-	33.3	1.0	-	24.8	7.5	33.3	48.2	-	81.5
Venezuela	11.3	-	8.1	19.4	-	-	14.7	4.7	19.4	13.8	-	33.2
Viet-Nam	7.3	-	10.8	18.1	6.8	-	7.2	4.1	18.1	7.0	8.6	33.7
Yugoslavia	13.7	19.4	45.9	79.0	35.5	-	35.4	8.1	79.0	70.9	8.9	158.8
Sub-total	708.4	507.0	898.5	2113.9	695.4	0.6	865.9	552.0	2113.9	1742.0	660.3	4516.2
<u>International projects</u>												
Africa	11.4	-	0.3	11.7	11.7	-	-	-	11.7	-	-	11.7
Americas	39.1	2.2	8.5	49.8	37.4	4.2	6.6	1.6	49.8	37.6	-	87.4
Asia and the Far East	28.4	3.3	-	31.7	31.7	-	-	-	31.7	26.6	-	58.3
Inter-regional projects	34.0	16.1	99.5	149.6	104.1	0.6	40.5	4.4	149.6	68.2	-	217.8
Trieste Centre	-	-	35.0	35.0	-	-	35.0	-	35.0	-	-	35.0
Sub-total	112.9	21.6	143.3	277.8	184.9	4.8	82.1	6.0	277.8	132.4	-	410.2
<u>Miscellaneous</u>												
Bank charges	9.5	-	-	9.5	4.5	-	5.0	-	9.5	-	-	9.5
GRAND TOTAL	830.8	528.6	1041.8	2401.2	884.8	5.4	953.0	558.0	2401.2	1874.4	660.3	4935.9

a/ Assistance in kind can only be estimated; see Introductory Notes, paras 6 and 7, to this Annex.

Table 8

Financial summary: 1958-1968  
(in thousands of dollars)

RECIPIENT	Expenditures and assistance provided in kind <sup>a/</sup>									Assistance outstanding		TOTAL (8) + (9) + (10)
	Type				Source					Unliquidated obligations	In kind balance <sup>a/</sup>	
	Experts	Equipment	Fellowships	TOTAL	UNDP(TA)		Agency		TOTAL			
					Monetary	In kind <sup>a/</sup>	Monetary	In kind <sup>a/</sup>				
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)	
<u>Country programmes</u>												
Afghanistan	74.9	78.1	53.1	206.1	70.1	-	86.0	50.0	206.1	-	3.1	209.2
Albania	-	-	6.4	6.4	-	-	-	6.4	6.4	-	3.9	10.3
Algeria	10.3	-	7.9	18.2	10.3	-	0.9	7.0	18.2	2.0	-	20.2
Argentina	415.6	269.6	375.2	1 060.4	396.8	0.6	402.8	260.2	1 060.4	47.7	13.9	1 122.0
Austria	62.0	13.8	105.8	181.6	-	-	122.1	59.5	181.6	5.5	-	187.1
Bolivia	70.1	36.7	32.0	138.8	24.5	-	98.5	15.8	138.8	36.3	7.5	182.6
Brazil	446.7	218.5	271.1	936.3	390.0	-	424.4	121.9	936.3	46.8	64.1	1 047.2
Bulgaria	4.0	15.6	180.9	200.5	0.5	-	141.9	58.1	200.5	36.0	18.5	255.0
Burma	208.4	120.1	75.4	403.9	299.1	-	52.5	52.3	403.9	82.6	2.4	488.9
Cambodia	45.3	28.3	1.7	75.3	-	-	68.0	7.3	75.3	2.5	-	77.8
Cameroon	0.6	1.6	-	2.2	2.2	-	-	-	2.2	14.9	-	17.1
Ceylon	169.9	73.4	26.3	269.6	97.9	-	134.8	36.9	269.6	8.8	-	278.4
Chile	153.3	99.9	104.1	357.3	111.8	-	156.8	88.7	357.3	55.8	9.5	422.6
China	172.4	91.1	391.2	654.7	204.2	-	178.2	272.3	654.7	68.1	30.3	753.1
Colombia	116.8	54.3	104.7	275.8	87.6	-	92.2	96.0	275.8	32.4	25.8	334.0
Congo, D. R.	35.1	33.3	13.8	82.2	9.6	-	60.6	12.0	82.2	9.3	10.6	102.1
Costa Rica	5.6	10.7	-	16.3	-	-	5.6	10.7	16.3	-	-	16.3
Cuba	18.8	5.4	6.8	31.0	-	-	28.8	2.2	31.0	9.0	-	40.0
Cyprus	2.4	-	-	2.4	-	-	2.4	-	2.4	1.2	0.8	4.4
CSSR	-	-	212.7	212.7	-	-	146.3	66.4	212.7	8.2	11.3	232.2
Denmark	12.9	-	31.3	44.2	-	-	31.2	13.0	44.2	-	-	44.2
Ecuador	18.2	25.9	58.4	102.5	21.3	-	46.1	35.1	102.5	18.3	4.1	124.9
El Salvador	27.3	6.0	6.5	39.8	14.1	-	16.3	9.4	39.8	4.6	-	44.4
Ethiopia	9.7	8.7	1.3	19.7	-	-	19.7	-	19.7	2.4	7.0	29.1
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	177.2	47.3	64.6	289.1	76.4	-	179.5	33.2	289.1	6.3	1.2	296.6
Greece	421.3	53.0	218.6	692.9	259.3	-	276.4	157.2	692.9	39.8	23.7	756.4
Guatemala	13.9	27.9	25.9	67.7	29.5	-	22.3	15.9	67.7	21.8	1.7	91.2
Hong Kong	20.0	20.6	-	40.6	-	-	40.6	-	40.6	0.8	-	41.4
Hungary	2.9	42.4	260.1	305.4	25.2	-	214.8	65.4	305.4	54.4	20.3	380.1
Iceland	19.7	62.8	13.9	96.4	-	-	44.0	52.4	96.4	0.3	-	96.7
India	15.7	50.9	495.0	561.6	125.5	-	131.4	304.7	561.6	78.2	39.8	679.6
Indonesia	193.0	66.3	473.9	733.2	160.2	-	227.5	345.5	733.2	66.5	35.7	835.4
Iran	351.5	21.5	296.1	669.1	281.2	0.5	215.6	171.8	669.1	33.5	7.8	710.4
Iraq	143.0	22.9	195.8	361.7	95.4	-	153.0	113.3	361.7	86.7	31.7	480.1
Israel	138.9	134.4	96.9	370.2	109.1	-	175.5	85.6	370.2	29.7	-	399.9
Italy	9.0	-	160.1	169.1	-	-	95.6	73.5	169.1	-	-	169.1
Ivory Coast	6.0	4.3	2.9	13.2	10.3	-	2.9	-	13.2	-	-	13.2
Jamaica	6.3	-	-	6.3	-	-	6.3	-	6.3	10.9	-	17.2
Japan	50.1	-	322.3	372.4	49.8	-	129.4	193.2	372.4	0.1	-	372.5
Jordan	27.8	-	11.5	39.3	39.3	-	-	-	39.3	0.9	-	40.2
Kenya	13.8	49.9	2.1	65.8	14.4	-	51.4	-	65.8	15.5	-	81.3
Korea, R.	175.6	65.2	497.4	738.2	115.1	-	313.9	309.2	738.2	29.9	41.9	810.0



Lebanon	30.2	9.5	14.9	54.6	-	-	47.6	7.0	54.6	20.7	-	75.3
Madagascar	-	-	1.9	1.9	-	-	1.9	-	1.9	-	-	1.9
Mali	2.1	-	-	2.1	2.1	-	-	-	2.1	-	-	2.1
Mexico	263.7	118.1	165.6	547.4	186.8	-	244.0	116.6	547.4	109.0	5.3	661.7
Monaco	-	-	4.2	4.2	-	-	4.2	-	4.2	-	-	4.2
Morocco	59.3	49.1	40.3	148.7	42.0	-	83.0	23.7	148.7	16.4	-	165.1
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	-	0.3	20.1	20.4	-	-	20.4	-	20.4	5.9	-	26.3
Nigeria	8.2	23.6	25.6	57.4	7.9	-	16.7	32.8	57.4	22.7	16.5	96.6
Norway	-	-	9.6	9.6	-	-	5.3	4.3	9.6	-	-	9.6
Pakistan	311.0	182.9	315.9	809.8	257.2	-	350.3	202.3	809.8	41.1	29.6	880.5
Panama	4.1	-	-	4.1	4.1	-	-	-	4.1	-	-	4.1
Paraguay	10.3	4.6	30.4	45.3	-	-	31.3	14.0	45.3	-	1.7	47.0
Peru	69.7	32.0	35.0	136.7	56.3	-	58.2	22.2	136.7	20.5	-	157.2
Philippines	224.9	239.6	465.7	930.2	334.8	8.9	287.6	298.9	930.2	33.9	26.2	990.3
Poland	0.6	99.2	444.8	544.8	135.4	-	281.7	127.7	544.8	21.5	22.0	588.3
Portugal	57.5	45.9	37.7	141.1	-	-	88.9	52.2	141.1	0.4	-	141.5
Rhodesia	2.2	17.8	7.6	27.6	25.4	-	2.2	-	27.6	-	-	27.6
Romania	16.6	46.7	158.7	222.0	27.0	-	134.8	60.2	222.0	20.8	11.1	253.9
Saudi Arabia	18.8	2.9	5.8	27.5	-	-	25.2	2.3	27.5	4.5	4.7	36.7
Senegal	70.8	56.0	9.8	136.6	53.2	0.8	82.6	-	136.6	3.5	-	140.1
Sierra Leone	5.9	-	-	5.9	-	-	5.9	-	5.9	15.8	-	21.7
Singapore	11.0	5.8	1.4	18.2	-	-	14.5	3.7	18.2	7.7	-	25.9
South Africa	-	-	107.8	107.8	-	-	42.1	65.7	107.8	-	-	107.8
Spain	-	-	49.7	49.7	-	-	31.0	18.7	49.7	-	3.6	53.3
Sudan	75.4	37.9	28.5	141.8	15.9	-	117.8	8.1	141.8	10.5	-	152.3
Sweden	-	-	8.8	8.8	-	-	8.8	-	8.8	-	-	8.8
Switzerland	-	-	12.6	12.6	-	-	5.6	7.0	12.6	-	-	12.6
Syria	2.6	-	1.2	3.8	3.8	-	-	-	3.8	17.4	-	21.2
Thailand	425.5	116.3	489.0	1 030.8	335.9	-	428.1	266.8	1 030.8	87.3	38.2	1 156.3
Tunisia	142.7	66.9	117.4	327.0	111.6	-	184.3	31.1	327.0	30.8	1.7	359.5
Turkey	337.9	157.9	365.3	861.1	187.8	-	424.2	249.1	861.1	34.1	28.7	923.9
Uganda	26.0	37.1	5.3	68.4	46.4	-	22.0	-	68.4	45.1	-	113.5
UAR	184.9	177.9	446.4	809.2	187.8	0.8	328.4	292.2	809.2	64.8	36.9	910.9
USA	-	-	2.6	2.6	-	-	2.6	-	2.6	-	-	2.6
Uruguay	34.8	33.5	15.7	84.0	14.3	-	57.8	11.9	84.0	48.2	-	132.2
Venezuela	48.0	30.7	137.9	216.6	14.0	-	88.4	114.2	216.6	13.8	-	230.4
Viet-Nam	48.8	45.5	64.1	158.4	31.4	-	76.5	50.5	158.4	7.0	8.6	174.0
Yugoslavia	105.5	109.5	559.0	774.0	289.7	-	322.7	161.6	774.0	70.9	8.9	853.8
Sub-total	6 465.7	3 609.2	9 521.7	19 596.6	5 503.3	11.6	8 572.4	5 509.3	19 596.6	1 742.0	660.3	21 998.9
<u>International projects</u>												
Africa	30.1	20.7	9.5	60.3	60.3	-	-	-	60.3	-	-	60.3
Americas	123.7	55.0	51.5	230.2	213.9	8.1	6.6	1.6	230.2	37.6	-	267.8
Asia and the Far East	177.6	49.5	23.7	250.8	247.2	1.5	2.1	-	250.8	26.6	-	277.4
Europe	21.0	18.6	17.3	56.9	56.9	-	-	-	56.9	-	-	56.9
Middle East	5.8	1.2	5.3	12.3	12.3	-	-	-	12.3	-	-	12.3
Inter-regional projects	270.8	155.9	669.7	1 096.4	613.8	0.6	468.1	13.9	1 096.4	68.2	-	1 164.6
Trieste Centre	-	-	175.0	175.0	-	-	175.0	-	175.0	-	-	175.0
Sub-total	629.0	300.9	952.0	1 881.9	1 204.4	10.2	651.8	15.5	1 881.9	132.4	-	2 014.3
<u>Miscellaneous</u>												
Bank charges	54.0	-	-	54.0	22.1	-	31.9	-	54.0	-	-	54.0
Mobile laboratories storage	-	6.5	-	6.5	-	-	6.5	-	6.5	-	-	6.5
GRAND TOTAL	7 148.7	3 916.6	10 473.7	21 539.0	6 729.8	21.8	9 262.6	5 524.8	21 539.0	1 874.4	660.3	24 073.7

a/ Assistance in kind can only be estimated; see Introductory Notes, paras 6 and 7 to this Annex.

## A N N E X II

### REGIONAL AND INTER-REGIONAL PROJECTS: 1968

#### A. UNDP(TA)

1. Visiting seminar on personnel, area and environmental monitoring in radiation protection;  
Argentina, Brazil, Chile, Colombia, Mexico, Uruguay and Venezuela,  
10 March-11 April.
2. Study tour in radiation protection;  
CSSR, Poland and USSR, 26 March-9 May.
3. Training course on applications of radioisotopes;  
Cairo, UAR, 1 April-31 July.
4. Training course on maintenance of nuclear electronic equipment;  
Turin, Italy, 1 April-30 June.
5. Training course on radioisotope techniques in medicine;  
Moscow, USSR, 3 June-16 August.
6. Advanced training course on medical applications of radioisotopes;  
Bucharest, Romania, 17 June-12 July.
7. Training course on waste management;  
Rio de Janeiro, Brazil, 14-25 October.
8. Training course on the application of radioisotopes in industry;  
Cairo, UAR, 19 October-11 December.
9. Regional adviser on the use of radioisotopes in hydrology;  
Africa.
10. Regional adviser on hospital physics;  
Bogota, Colombia.
11. Regional adviser on industrial applications of radioisotopes;  
Latin America.
12. Demonstration project in the application of neutron diffraction (IPA project);  
Manila, Philippines.
13. Regional adviser on rice production;  
Bangkok, Thailand.
14. Regional adviser on industrial applications of radioisotopes;  
Bangkok, Thailand.

B. AGENCY'S REGULAR PROGRAMME

1. Advanced training course on the physics of radiotherapy;  
London, UK, 5 February-5 July.
2. Training course on legal aspects of the utilization of atomic energy;  
IAEA Headquarters, Vienna, Austria, 16-26 April.
3. Visiting seminar on safety aspects of reactor siting, design and operation;  
Argentina, Brazil, Colombia, Mexico, Uruguay and Venezuela, 1-21 May.
4. Training course on the use of radiation and isotope techniques in horticultural research;  
Hanover, Federal Republic of Germany, 22 July-13 September.

A N N E X III

IAEA HYDROLOGICAL SERVICES: SUB-CONTRACTS IN 1968[ 1 ]

<u>Country or region and project number</u>	<u>Title</u>	<u>Cost of services provided</u>
Dahomey DAH-3	Pilot development of groundwater	\$ 600
India IND-60	Land and water use and management in the Cambal-irrigated area, Rajasthan	1 700
Jordan JOR-9	Investigation of the sandstone aquifers of East Jordan	6 610
Niger NER-8	Surveys for the agricultural development of the Dallol Maouri	140
Spain SPA-9	Hydrogeological investigations in the Guadalquivir River Basin	490
Africa Regional REG-79	Survey of the water resources of the Chad Basin for development purposes	8 040
	TOTAL	<u>\$17 580</u>

[ 1 ] In 1968 all sub-contracted services were provided to FAO in connection with UNDP(SF) projects.