THE AGENCY'S PROGRAMME FOR 1975 - 80 AND BUDGET FOR 1975

GC(XVIII)/526

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INTERNATIONAL ATOMIC ENERGY AGENCY

CONTENTS

ANNEXES

LIST OF ABBREVIATIONS

ACABQ	Advisory Committee on Administrative and Budgetary Questions of the General Assembly of the United Nations
Agency	International Atomic Energy Agency
AGRIS	Agricultural Information System
BIPM	Bureau International des Poids et Mesures (International Bureau of Weights and Measures)
Board	Board of Governors (of the Agency)
CCAQ	Consultative Committee on Administrative Questions
CINDA	Computer Index of Neutron Data
CMEA	Council for Mutual Economic Assistance
D	Director
DDG	Deputy Director General
DG	Director General
ECE	Economic Commission for Europe (of the United Nations)
ECOSOC	Economic and Social Council of the United Nations
EAAFRO	East African Agriculture and Forestry Research Organization
EPPO	European and Mediterranean Plant Protection Organization
ESNA	European Society for Nuclear Methods in Agriculture
EUCARPIA	European Association for Research on Plant Breeding
EURATOM	European Atomic Energy Community
EXFOR	Exchange Format for Neutron Data
FAO	Food and Agriculture Organization of the United Nations
GS	General Service category (staff)
GSF	Gesellschaft für Strahlen- und Umweltforschung
IAEA	International Atomic Energy Agency
IAMS	International Association of Microbiological Societies
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IBP	International Biological Programme

IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
ICIPE	International Centre of Insect Physiology and Ecology
ICRISAT	International Crop Research Institute for the Semi-arid Tropics
ICRP	International Commission on Radiological Protection
ICRU	International Commission on Radiation Units and Measurements
ICSH	International Committee for Standardization in Haematology
ICSU	International Council of Scientific Unions
IFIP	International Project in the Field of Food Irradiation
IG	Inspector General
IHD	International Hydrological Decade
IIASA	International Institute for Applied Systems Analysis
IITA	International Institute for Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILO	International Labour Organisation
ILRAD	International Laboratory for Research on Animal Disease
IMCO	Inter-Governmental Maritime Consultative Organization
INIS	International Nuclear Information System
IOBC	International Organization for Biological Control of Noxious Animals and Plants
IRRI	International Rice Research Institute
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
Joint FAO/IAEA Division	Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture
M&O	Maintenance and Operatives Service (staff)
MHD	Magnetohydrodynamics
Monaco Laboratory	International Laboratory of Marine Radioactivity at Monaco
NORAD	Norwegian Agency for International Development
NPT	Treaty on the Non-Proliferation of Nuclear Weapons (reproduced in document INFCIRC/140)

OECD(NEA)	Organisation for Economic Co-operation and Development (Nuclear Energy Agency)
P	Professional category (staff)
SABRAO	Society for the Advancement of Breeding Research in Asia and Oceania
SIDA	Swedish International Development Authority
Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNIPEDE	International Union of Producers and Distributors of Electrical Energy
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
UPU	Universal Postal Union
USAEC	United States Atomic Energy Commission
US-AID	United States Agency for International Development
USDA	United States Department of Agriculture
WARDA	West African Rice Development Agency
WHO	World Health Organization
WMO	World Meteorological Organization
WRENDA	World Request List for Nuclear Data Measurements

NOTES

1. All sums of money are expressed in United States dollars.

2. Round brackets are used in financial tables to indicate decreases, and in other tables to indicate the change in the situation from 1974, as shown in the budget for that year (GC(XVII)/505 and Mod. 1).

INTRODUCTION

General

1. In accordance with Article XIV. A of the Statute, the Board of Governors hereby submits to the General Conference the budget estimates for 1975, preliminary estimates for 1976 and the programme of work of the Agency for the six-year period 1975-80. The Board requests the Conference to adopt the draft resolutions set forth in Annex V.

2. The estimates for 1976 are based on already known conditions and trends and are presented as preliminary estimates only. Final budget estimates for 1976 will be presented to the General Conference at its nineteenth regular session, with supporting programme explanations if significant changes have occurred. Adjustments to the preliminary figures may be necessary as a result of changes in programme emphasis or of factors outside the control of the Agency.

Format

3. An attempt has been made to comply with requests made by Members of the Board of Governors and the Administrative and Budgetary Committee for the costs of service activities to be apportioned to the various programmes. This has been done in respect of interpretation, translation, the preparation of summary records, publishing and reproduction services. The cost estimates and manning table posts for these services are summarized under the programme entitled "Service Activities" before apportionment to the various programmes. While every effort has been made to identify the costs relating to individual programmes, a degree of approximation is necessarily involved in apportioning charges to sub-programmes. In line with the objective of showing all the costs involved in holding meetings, the funds required for interpretation and for printing services have been included in the estimates for meetings.

4. To permit meaningful comparison with the 1975 estimates, the actual obligations for 1973 and the adjusted budget for 1974 reflect the apportionment of the costs of service activities. Computer service costs presented a problem of definition, and calculations have consequently been made on the basis of the best available information. It should be noted that the cost estimates under the various programmes are in this respect only indicative.

5. The presentation introduced in the last six-year programme, with the emphasis on technical projects rather than functions, has met with general acceptance; an attempt has been made to improve this presentation in the present programme. The presentation of the programme entitled "Administration" has been simplified.

6. Steps have been taken to reduce the number of categories of meetings held by the Agency. In future, all meetings will fall into one of four categories: "Conferences/Symposia", "Seminars", "Technical Committees" (ad hoc or standing) and "Advisory Groups". In addition to the convening of smaller meetings (i. e. Technical Committees and Advisory Groups), it will still be possible to appoint consultants for special purposes.

7. Work relating to a number of sub-programme components has been completed and the activities constituting these components phased out. Further activities will be phased out in 1975-76. Besides the reductions in sub-programmes and components resulting from this phasing-out process, other components have been amalgamated to avoid excessive dispersion of effort, and consequently to achieve economy and greater efficiency in executing the programme. The scientific programme for 1975-80 consists of 69 components, compared with 96 components in the programme for 1973-78.

8. Many activities - such as those relating to environmental problems, reactor safety and reliability, and dosimetry - involve collaboration between two or more Divisions. In order that duplication of effort may be avoided, there is close co-ordination of the work of the collaborating Divisions, although it is not always referred to in the text of this document; co-operation with other organizations is mentioned throughout the document.

Trends in the overall programme

9. The programme for 1975-76, which has been set out in considerable detail, reflects the expected expansion in national nuclear power programmes, due to developments affecting fossil fuel supplies and costs, and the consequent need to expand activities in the field of nuclear safety and environmental protection.

10. There will be an intensification of activities connected with the growth of nuclear power generation, aimed at the formulation of acceptable safety criteria for nuclear power plants, together with reliability requirements directly related to safety. The resulting recommendations will serve as a standard frame of reference for analysing nuclear plant safety and reliability. In carrying out these tasks the Agency will be assisted by a standing group of highly qualified international experts. Another subject to which increasing attention will be given is the technology and practice of treating high-level and alpha-bearing radioactive wastes.

11. Attention will continue to be paid to nuclear power plant technology and to the development of advanced reactors and advanced reactor technology. In the light of the importance of the continuity of nuclear material supplies, more will be done in connection with the forecasting of energy requirements and the estimation of world nuclear material resources. An increase in the demands for enriched uranium may be expected, and the question of how these can be obtained by States with no domestic production from the few industrialized States able to supply them will be a subject of study. Further nuclear power market surveys will be carried out, with special reference to the needs of developing countries, and the results of the survey which has already been completed will be brought up to date. In this connection, a bank of data will be gradually assembled for use in making economic and technical assessments and projections in relation to the planned introduction of nuclear power. In addition, studies will be undertaken with a view to preparing guide-books on all stages of the introduction of nuclear power in developing countries, from initial consideration of the project to steady operation of the plant; the guide-books would deal with such subjects as staffing requirements and the training of construction and operating personnel.

12. The main activities in the "Food and Agriculture" programme will continue; there will, however, be some modification of the programme through the phasing-out of certain projects and the starting of new projects in similar fields. The energy crisis, by causing fertilizer prices to rise, has led to awareness of the importance of projects directed to the more efficient use of fertilizers, particularly in the developing countries.

13. The Agency's "Life Sciences" programme will continue to comprise medicine, dosimetry and biology and to be carried out in consultation with WHO. It is the continuing policy of the Agency to hand over to WHO or other appropriate organizations those activities which relate to procedures whose application has become routine; for example, dose intercomparisons will become increasingly the responsibility of regional or local Secondary Standards Dosimetry Laboratories.

14. In the "Physical Sciences" programme, efforts will be concentrated on various aspects of plasma physics and controlled fusion research, materials analysis and the production and utilization of radioisotopes; the last-mentioned activity is important in that many developing countries are interested in the industrial applications of isotopes, as indicated by the fact that the Agency is the executing agency for four large-scale projects relating to such applications. The transfer of the component entitled "Utilization of research reactors" to the "Physical Sciences" programme from the "Nuclear Power and Reactors" programme reflects the need in developing countries for improved research programmes involving the use of research reactors.

15. The "Technical Assistance and Training" programme will continue to reflect the priorities set by requesting Governments. With the present increased interest in nuclear power, it is to be expected that the Agency's technical assistance will be devoted increasingly to programmes concerned with the introduction of nuclear power, and particularly with the training of personnel. It is also to be expected that substantial assistance will be provided for the exploration and development of uranium resources. Requests for assistance with agricultural research designed to increase yields are expected to continue, and support will be given to education and research establishments in the development of scientific infrastructures and in applied research.

16. So far 117 safeguards agreements have been concluded. All of them have been or are being implemented; however, 25 NPT agreements are with States having no significant peaceful nuclear activities. It is expected that safeguards under the agreement with EURATOM and Member States of EURATOM will reach the full level of application in 1975. This, together with the application of safeguards as a result of the offers made by the United States of America and the United Kingdom will bring about a considerable increase in the amount of nuclear material subject to safeguards. Hence, it is planned that, in 1975, a safeguards analytical laboratory will be operated by the Department of Research and Isotopes and that work under a number of contracts with analytical laboratories in Member States will be carried out.

17. The Scientific Advisory Committee has highly commended the work of INIS, which continues to expand and is expected to reach steady-state operation at around 80 000 items a year in 1975. It is expected that INIS will handle abstracts in machine-readable form in the later years of the six-year programme period.

18. It is expected that by the end of this period the Agency will have moved to its permanent headquarters at the Donaupark. For some of the Agency's services, such as the Library and the Computer Section, the move will inevitably result in substantial disruption. At the Donaupark, the Library and the Computer Section - and also the printing services - will form part of the joint services to be established there by the Agency and UNIDO.

Adjustments made in the estimates and manning table for 1974

19. Since the Agency's budget for 1974 was approved, various actions affecting the budget estimates for the different programmes have been taken. In order to provide an explanation of the adjustments made and to permit meaningful comparison with the 1975 estimates, a "1974 Adjusted budget" has been drawn up. The considerations which have been reflected in these adjustments are set out below.

20. When the initial preparation of the estimates for 1974 was nearing completion, the United Nations rate of exchange was fixed at 23.20 Austrian schillings to the United States dollar. In order to compensate for a subsequent change of the exchange rate to 18 schillings to the dollar, an amount of $4.6 million for contingent financing was appropriated[1]. These funds will be used only with the approval of the Board of Governors and solely for the purpose of compensating for changes in currency exchange rates. Following changes of the schilling-dollar exchange rate in the opposite direction, the 1974 adjusted budget estimates have been prepared on the basis of a rate of 21 schillings to the dollar. Consequently, adjustments have been made in the programme cost estimates for 1974 by apportioning an amount of $2 million to various programmes. Although the 1974 budget has been adjusted on the assumption that, at an exchange rate of 21 schillings to the dollar, $2 million will be required, it is apparent that, if the exchange rate averages 18.70 schillings to the dollar, the amount needed for 1974 will increase to about $3 800 000. All other changes represent shifts of a few posts and the related costs between programmes within the overall approved manning table and estimates included in the 1974 budget.

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[1] GC(XVII)/RES/304.

The Regular Budget for 1975

21. The programme estimates for 1975 are based on an exchange rate of 21 schillings to the dollar. However, when the Board approved the estimates the United Nations rate of exchange stood at 18.25 schillings to the dollar. Assuming an average rate of exchange of 18.50 for 1975 an adjustment of programme cost estimates of $2.8 million was included.

22. The Board recommends that the balance of the 1974 contingent financing appropriation of $800 000 that is not required be used to meet the budgetary requirements of 1975 and thus reduce the assessment on Member States.

23. The total appropriation proposed for the Regular Budget for 1975 amounts to $29 675 000. After deducting expected income of $2 215 000 and a transfer of the balance of $800 000 of the contingent financing appropriation for 1974, the total amount to be assessed on Member States is $26 660 000 which represents an increase of $3 523 000 or 15.2% compared with the assessment for 1974.

24. Of the total increase of 15.2% in the level of assessment, 7.0% results from price increases and 8.2% represents programme increases.

25. The impact of inflation has not been the same in all areas of expenditure; for example the costs of staff services and supplies were affected more than those of travel, meetings and scientific and technical contracts.

26. Provisions are included in the 1975 estimates to meet cost increases resulting from the expansion of some existing programmes. In particular, the establishment of a network of analytical laboratories for safeguards will require additional funds. The programme cost increase under "Information and Technical Services" relates primarily to the expansion of INIS to full-scope operation and the acquisition of increased core capacity and of ancillary data processing equipment. Additional funds are included for the promotion of nuclear power in Member States and for expanded activities related to nuclear safety and environmental protection.

27. Attention is drawn particularly to the co-operation between the Agency and UNEP. Proposals for eleven joint projects extending over periods of one to seven years have been submitted to UNEP, five involving the Agency and UNEP only and six also involving FAO, WHO or UNESCO. The total value of the projects is $5 603 800, of which the UNEP contribution would amount to $3 723 500. Preliminary information indicates that UNEP has, so far, approved five projects involving a contribution of $1 055 300 of which $178 000 has already been allocated. The remaining projects are being examined by UNEP. The implementation of projects approved by UNEP will not entail the recruitment of additional staff.

28. No provision has been made in the 1976 preliminary estimates for additional costs associated with the move to the International Centre at the Donaupark. The costs of removal and of furniture and equipment, and also the higher operating expenses associated with the occupancy of larger premises, are being studied in detail.

Target for voluntary contributions to the General Fund

29. In 1973, problems associated with the increased cost of providing technical assistance and the growing needs of developing countries were discussed by the Board of Governors and the General Conference. It was generally agreed that the target for voluntary contributions to the General Fund for 1975 should be increased and Members were urged to increase their contributions to the General Fund for 1974. [2] The target for a given year will be exceeded for the first time in respect of 1974, for which a target of $3 million has been established; pledges amounted to about 94% of the target in 1973 and 60-80% in most previous years.

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[2] See document GC(XVII)/505, para. A.10.

30. During its deliberations in 1974 the Board recognized the needs of the developing countries for increased technical assistance and accordingly recommends that the target for voluntary contributions to the General Fund for 1975 be established at $4.5 million.

Working Capital Fund

31. The Board proposes that for 1975 the Agency's Working Capital Fund should remain at the same level as for 1974, namely $2 million. This proposal is reflected in draft resolution C in Annex V. This level will be adequate to maintain the cash liquidity of the Agency only if Members pay their assessments promptly as they have for the most part done this year.

Report on the budget to the United Nations General Assembly

32. In accordance with Article XVI of the Agency's relationship agreement with the United Nations[3], the budget will be reviewed by ACABQ, which will report on the administrative aspects thereof to the Assembly.

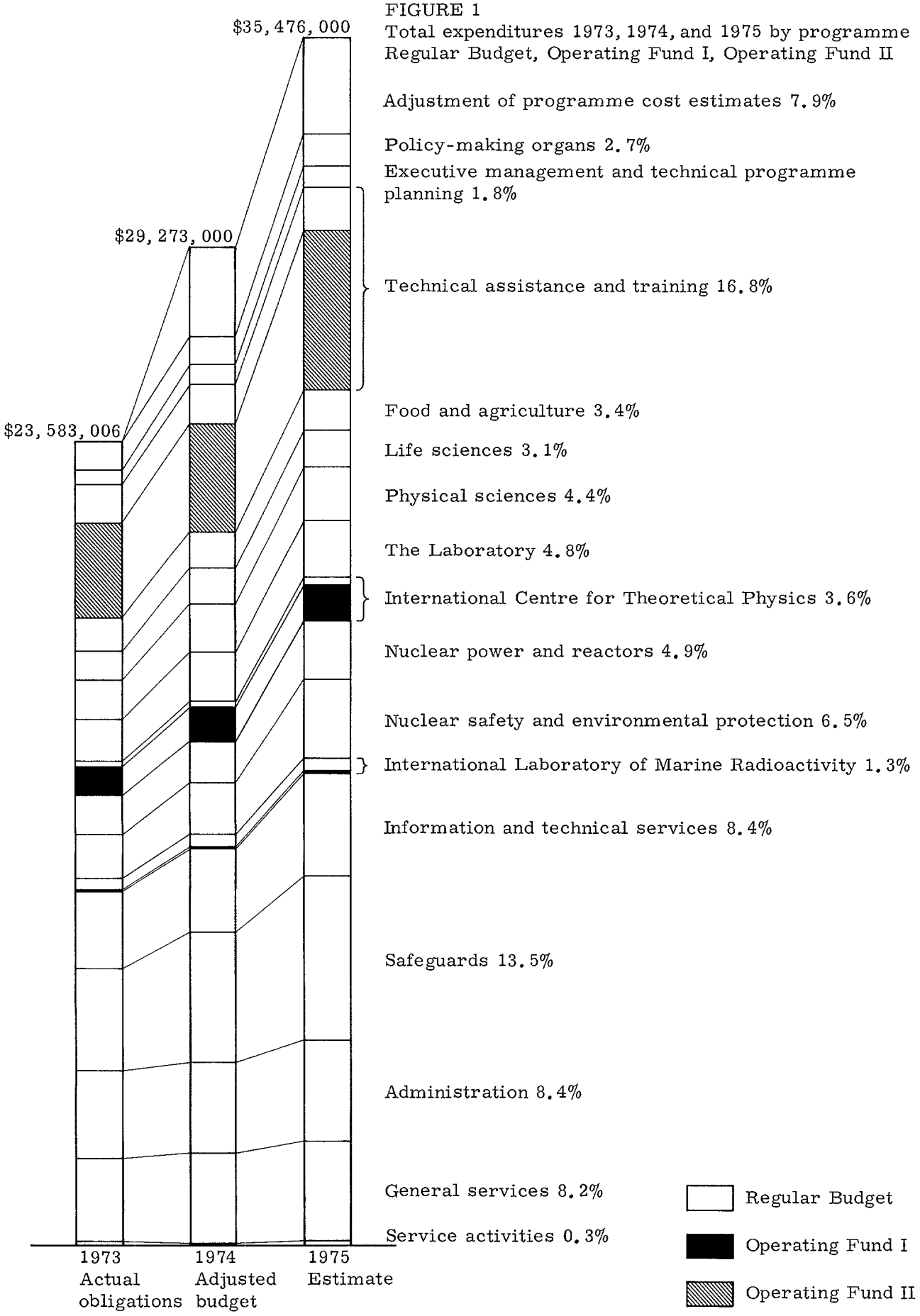
[3] INFCIRC/11, part I.

THE CONSOLIDATED BUDGET

Item	1973 Actual	1974 Adjusted	1975 Estimate
RECEIPTS			
Regular Budget			
Assessed contributions of Member States	17 017 697	23 137 000	26 660 000
Transfer of 1971 and 1972 cash surpluses for the use in 1973	234 277	-	-
Transfer of the balance of contingent financing appropriation for 1974	-	-	800 000
Special contributions	178 786	-	-
Miscellaneous income	1 699 430	1 927 000	2 215 000
General Fund			
Voluntary contributions	2 836 246	3 000 000	4 500 000
Miscellaneous income	159 055	80 000	100 000
Operating Fund I			
Special contributions by Member States	330 548	345 000	395 000
Direct contributions for special projects	454 852	686 600	696 500
Miscellaneous income	10 781	32 400	29 500
Drawings on unobligated balance	99 170	-	-
Savings on prior years' operations	1 055	-	-
Operating Fund II			
Government contributions in respect of technical assistance provided	80 136	65 000	80 000
Miscellaneous income	28 294	-	-
Additions to unobligated balance	(298 299)	-	-
	22 832 028[a/]	29 273 000	35 476 000
EXPENDITURES			
Regular Budget	19 881 168	25 064 000	29 675 000
Operating Fund I	896 406	1 064 000	1 121 000
Operating Fund II	2 805 432	3 145 000	4 680 000
	23 583 006	29 273 000	35 476 000

a/ The difference of $750 978 between expenditures and receipts represents the provisional cash deficit for 1973.

FIGURE 1
Total expenditures 1973, 1974, and 1975 by programme
Regular Budget, Operating Fund I, Operating Fund II



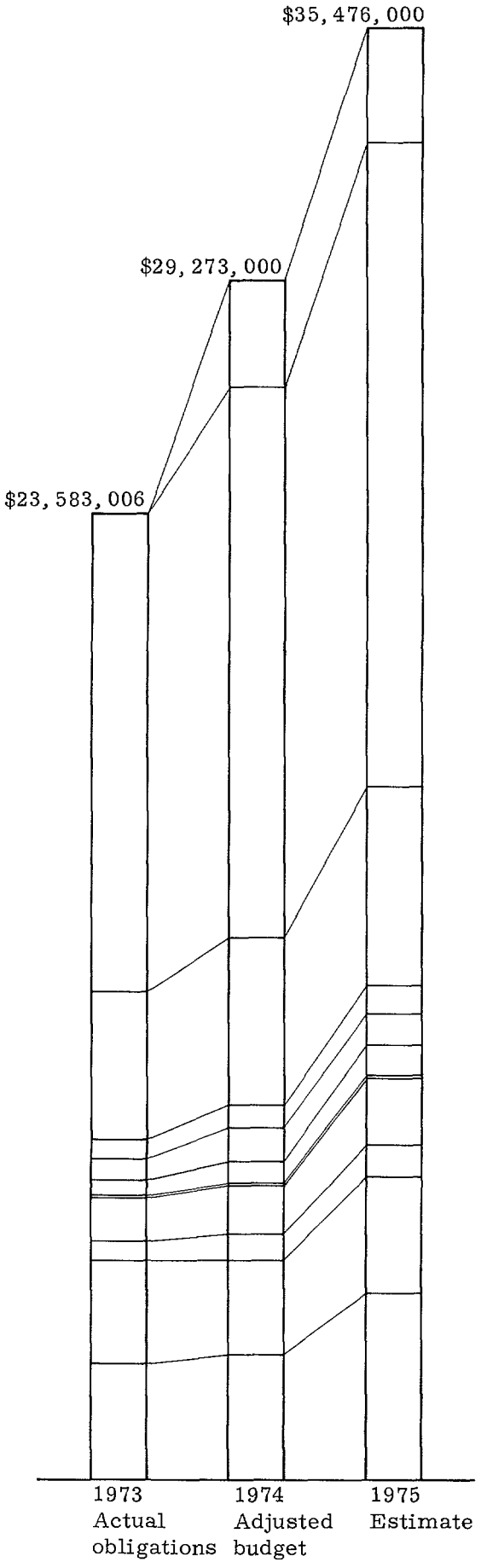


FIGURE 2
Total costs for 1973, 1974 and 1975 by item of expenditure

Adjustment of programme cost estimates 7.9%

Salaries and wages 44.2%

Common staff costs 13.6%

Travel 2.0%
Conferences, symposia and seminars 2.2%
Technical committees, advisory groups 2.1%
Representation and hospitality 0.2%

Scientific and technical contracts 4.6%

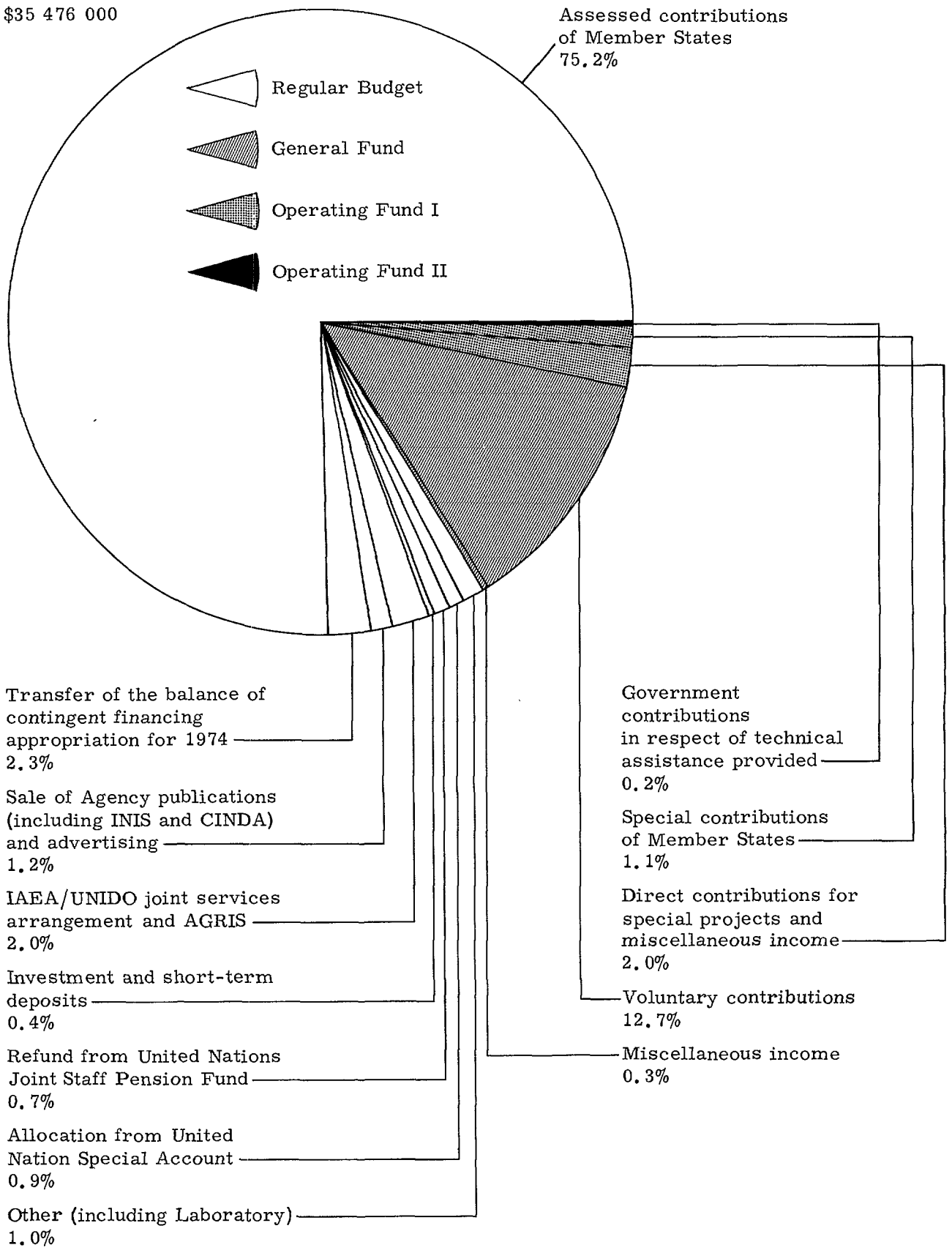
Scientific supplies and equipment 2.2%

Common services, supplies and equipment 8.1%

Other 12.9%

Consists of:	
Operating Fund II	$4 680 000
Inter-agency activities	62 500
International Centre for Theoretical Physics	260 000
External audit	10 500
Linguistic services	(391 000)
Printing and publishing services	(55 000)
	$4 567 000

FIGURE 3
Total income for 1975 by source



THE REGULAR BUDGET

Summary of expenditures and income

Item	1973 Actual	1974 Adjusted budget	Increase or (decrease) over 1975	1975 Estimate
Expenditures				
Policy-making organs	822 924	863 000	95 000	958 000
Executive management and technical programme planning	421 895	597 000	41 000	638 000
Technical assistance and training	1 112 767	1 142 000	143 000	1 285 000
Food and agriculture	987 312	1 080 000	111 000	1 191 000
Life sciences	863 643	1 063 000	24 000	1 087 000
Physical sciences	1 117 865	1 418 000	143 000	1 561 000
The Laboratory	1 261 627	1 448 000	250 000	1 698 000
International Centre for Theoretical Physics	160 000	181 000	39 000	220 000
Nuclear power and reactors	1 141 952	1 211 000	517 000	1 728 000
Nuclear safety and environmental protection	1 282 699	1 500 000	809 000	2 309 000
International Laboratory of Marine Radioactivity	313 763	329 000	63 000	392 000
Information and technical services	2 268 435	2 427 000	570 000	2 997 000
Safeguards	3 037 030	3 868 000	934 000	4 802 000
Administration	2 542 701	2 640 000	336 000	2 976 000
General services	2 456 389	2 632 000	286 000	2 918 000
Service activities	90 166	65 000	50 000	115 000
Adjustment of programme cost estimates	-	2 600 000	200 000	2 800 000
	19 881 168 [a]	25 064 000	4 611 000	29 675 000
Income				
Assessed contributions on Member States	17 017 697	23 137 000	3 523 000	26 660 000
Transfer of 1971 and 1972 cash surpluses for use in 1973	234 277	-	-	-
Transfer of the balance of contingent financing appropriation for 1974 [b]	-	-	800 000	800 000
Special contributions	178 786	-	-	-
Miscellaneous income				
(a) Attributable to specific programmes				
Publications of the Agency	240 690	400 000	(100 000)	300 000
INIS publications including microfiches	66 144	100 000	10 000	110 000
INIS tapes	2 796	6 000	(2 000)	4 000
CINDA publications	19 875	12 000	2 000	14 000
Advertising	9 148	10 000	-	10 000
Laboratory income	28 911	50 000	-	50 000
Sale of surplus property	3 123	10 000	(3 000)	7 000
IAEA/UNIDO joint services arrangement				
Computer services	226 194	220 000	124 000	344 000
Printing services	90 166	65 000	50 000	115 000
Other services	96 425	94 000	47 000	141 000
Amounts recoverable under safeguards agreements from non-member States	27 790	10 000	(2 000)	8 000
Reimbursement under the food irradiation project	-	20 000	(20 000)	-
Allocation from the United Nations Special Account	259 215	330 000	-	330 000
Reimbursable services for AGRIS	3 121	-	95 000	95 000
Sub-total	1 073 598	1 327 000	201 000	1 528 000
(b) Not attributable to specific programmes				
Investment and short-term deposits	272 361	140 000	17 000	157 000
Refund from the United Nations Joint Staff Pension Fund	176 557	120 000	110 000	230 000
Other	176 914	340 000	(40 000)	300 000
Sub-total	625 832	600 000	87 000	687 000
Total miscellaneous income	1 699 430	1 927 000	288 000	2 215 000
TOTAL	19 130 190 [a]	25 064 000	4 611 000	29 675 000

a/ The difference of $750 978 between expenditures and receipts represents the provisional cash deficit for 1973 - see The Agency's Accounts for 1973, Statement I. C (GC(XVIII)/527).

b/ See Table Q. 1 below.

THE OPERATIONAL BUDGET

Summary of income, allocations and expenditures

Item	General Fund			Operating Fund I			Operating Fund II		
	1973 Actual	1974 Budget	1975 Estimate	1973 Actual	1974 Budget	1975 Estimate	1973 Actual	1974 Budget	1975 Estimate
INCOME									
Voluntary contributions of Member States	2 836 246	3 000 000	4 500 000	-	-	-	-	-	-
Special contributions of Member States:									
Italian Government	-	-	-	250 000	300 000	350 000	-	-	-
Monaco Government	-	-	-	54 348	45 000	45 000	-	-	-
Other Member States	-	-	-	26 200	-	-	-	-	-
Direct contributions for special projects:									
Ford Foundation	-	-	-	60 000	-	-	-	-	-
UNESCO	-	-	-	160 000	186 000	225 000	-	-	-
UNDP	-	-	-	161 400	434 600	280 000	-	-	-
SIDA	-	-	-	66 555	66 000	191 500	-	-	-
Others	-	-	-	6 897	-	-	-	-	-
Income from investment and short-term deposits	122 927	80 000	100 000	-	-	-	-	-	-
Government contributions in respect of technical assistance provided	-	-	-	-	-	-	80 136	65 000	80 000
Miscellaneous income	36 128	-	-	10 781	32 400	29 500	28 294	-	-
Additions to unobligated balance	-	-	-	-	-	-	(298 299)	-	-
Drawing on unobligated balance	-	-	-	99 170	-	-	-	-	-
Savings in prior years' operations	-	-	-	1 055	-	-	-	-	
	2 995 301	3 080 000	4 600 000	896 406	1 064 000	1 121 000	(189 869)	65 000	80 000
Transfers from General Fund to Operating Fund II:	(2 995 301)	(3 080 000)	(4 600 000)	-	-	-	2 995 301	3 080 000	4 600 000
TOTAL	-	-	-	896 406	1 064 000	1 121 000	2 805 432	3 145 000	4 680 000
ALLOCATIONS AND EXPENDITURES									
Operating Fund I:									
Trieste Centre	-	-	-	833 007	1 009 000	1 051 000	-	-	-
Monaco Laboratory	-	-	-	63 399	55 000	70 000	-	-	-
Operating Fund II:									
Technical assistance:									
Experts and equipment	-	-	-	-	-	-	1 969 012	2 445 000	3 180 000
Fellowships and training	-	-	-	-	-	-	836 420	700 000	1 500 000
TOTAL	-	-	-	896 406	1 064 000	1 121 000	2 805 432	3 145 000	4 680 000
UNDP:									
Fellowships and training							532 429		
Experts and equipment							2 317 096		
							2 849 525		
							5 654 957		

THE PROGRAMME BUDGET

Total price and programme increase by programme, 1974-1975

Table 1

		1974 Budget	1974 Adjusted budget	Price increase		Programme increase		Total change		1975 Estimate	1976 Preliminary estimate
		$	$	$	%	$	%	$	%	$	$
A.	Policy-making organs	837 000	863 000	97 000	11.2	(2 000)	(0.2)	95 000	11.0	958 000	1 052 000
B.	Executive management and technical programme planning	428 000	597 000	57 800	9.7	(16 800)	(2.8)	41 000	6.9	638 000	692 000
C.	Technical assistance and training										
	Regular Budget	984 000	1 142 000	123 400	10.8	19 600	1.7	143 000	12.5	1 285 000	1 412 000
	Operating Fund II	3 145 000	3 145 000	a/		a/		1 535 000	48.8	4 680 000	4 680 000 b/
		4 129 000	4 287 000	123 400 c/		19 600 c/		1 678 000	39.1	5 965 000	6 092 000 b/
D.	Food and agriculture	746 000	1 080 000	85 200	7.9	25 800	2.4	111 000	10.3	1 191 000	1 295 000
E.	Life sciences	858 000	1 063 000	81 000	7.6	(57 000)	(5.3)	24 000	2.3	1 087 000	1 243 000
F.	Physical sciences	992 000	1 418 000	125 000	8.8	18 000	1.3	143 000	10.1	1 561 000	1 772 000
G.	The Laboratory	1 365 000	1 448 000	187 500	12.9	62 500	4.3	250 000	17.2	1 698 000	1 974 000
H.	International Centre for Theoretical Physics										
	Regular Budget	181 000	181 000	17 000	9.4	22 000	12.1	39 000	21.5	220 000	230 000
	Operating Fund I	1 009 000	1 009 000	67 300	6.7	(25 300)	(2.5)	42 000	4.2	1 051 000	876 000
		1 190 000	1 190 000	84 300	7.1	(3 300)	(0.3)	81 000	6.8	1 271 000	1 106 000
I.	Nuclear power and reactors	991 000	1 211 000	135 000	11.1	382 000	31.5	517 000	42.6	1 728 000	2 052 000
J.	Nuclear safety and environmental protection	1 142 000	1 500 000	134 000	8.9	675 000	45.0	809 000	53.9	2 309 000	2 757 000
K.	International Laboratory of Marine Radioactivity										
	Regular Budget	301 000	329 000	41 800	12.7	21 200	6.4	63 000	19.1	392 000	440 000
	Operating Fund I	55 000	55 000	10 000	18.2	5 000	9.1	15 000	27.3	70 000	70 000
		356 000	384 000	51 800	13.5	26 200	6.8	78 000	20.3	462 000	510 000
L.	Information and technical services	1 869 000	2 427 000	228 400	9.4	341 600	14.1	570 000	23.5	2 997 000	3 255 000
M.	Safeguards	3 441 000	3 868 000	429 300	11.1	504 700	13.0	934 000	24.1	4 802 000	6 145 000
N.	Administration	2 260 000	2 640 000	323 500	12.2	12 500	0.5	336 000	12.7	2 976 000	3 291 000
O.	General Service	3 310 000	2 632 000	233 000	8.9	53 000	2.0	286 000	10.9	2 918 000	3 209 000
P.	Service activities	759 000	65 000	50 000	76.9	-	-	50 000	76.9	115 000	130 000
	Sub-total	24 673 000	26 673 000	2 426 200 c/		2 041 800 c/		6 003 000	22.5	32 676 000	36 575 000 b/
Q.	Adjustment of programme cost estimates	-	1 800 000	1 000 000	-	-	-	1 000 000	-	2 800 000	2 800 000
	Contingent financing for 1974	4 600 000	800 000	(800 000)	-	-	-	(800 000)	-	-	-
	TOTAL	29 273 000	29 273 000	2 628 200 c/		2 041 800 c/		8 203 000	21.2	35 476 000	39 375 000 b/
Source of funds:											
	Regular Budget										
	Programme Budget	25 064 000	24 264 000	3 348 900	13.8	2 062 100	8.5	5 411 000	22.3	29 675 000	33 749 000
	Balance of contingent financing for 1974	-	800 000	(800 000)		-		(800 000)		-	-
	Adjusted Regular Budget	25 064 000	25 064 000	2 548 900	10.2	2 062 100	8.2	4 611 000	18.4	29 675 000	33 749 000
	Operating Fund I	1 064 000	1 064 000	77 300	7.3	(20 300)	(1.9)	57 000	5.4	1 121 000	946 000
	Operating Fund II	3 145 000	3 145 000	a/		a/		1 535 000	48.8	4 680 000	4 680 000 b/
	TOTAL	29 273 000	29 273 000	2 626 200 c/		2 041 800 c/		6 203 000	21.2	35 476 000	39 375 000 b/
	Regular Budget	25 064 000	25 064 000	2 548 900	10.2	2 062 100	8.2	4 611 000	18.4	29 675 000	33 749 000
	Less: Income	1 927 000	1 927 000	923 000 d/	47.9	165 000	8.6	1 088 000	56.5	3 015 000 d/	2 316 000
	Assessment on Member States	23 137 000	23 137 000	1 625 900	7.0	1 897 100	8.2	3 523 000	15.2	26 660 000	31 433 000

a/ Since the total change of $1 535 000 is largely due to the raising of the target for voluntary contributions to the General Fund for the first time since 1972, no distribution between price and programme increases for 1975 can be made.

b/ This figure, which assumes the same target as for 1975, is included solely for the purpose of completing the column.

c/ Excluding the pro-rating of the total change in respect of Operating Fund II from 1974 to 1975.

d/ Includes $800 000, the balance of contingent financing for 1974 - see Table Q.1 below.

Summary of total costs

Table 2

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	11 154 396	12 887 500	1 494 700	554 400	2 049 100	14 936 600	17 138 400
Consultants	191 478	175 100	11 500	158 600	170 100	345 200	424 600
Overtime	77 897	76 000	8 800	2 600	11 400	87 400	96 000
Temporary assistance	221 328	249 900	29 100	45 700	74 800	324 700	372 700
Sub-total	11 645 099	13 388 500	1 544 100	761 300	2 305 400	15 693 900	18 031 700
Common staff costs	3 624 425	4 133 600	523 500	180 900	704 400	4 838 000	5 520 000
Travel	463 962	562 400	34 000	105 200	139 200	701 600	806 400
Meetings							
Conferences, symposia, seminars	525 346	807 600	44 100	(66 700)	(22 600)	785 000	838 000
Technical committees, advisory groups	387 123	514 000	32 400	198 200	230 600	744 600	747 900
Representation and hospitality	55 667	66 800	3 900	5 900	9 800	76 600	80 800
Scientific and technical contracts	1 078 605	1 201 400	56 700	358 200	414 900	1 616 300	2 067 500
Scientific supplies and equipment	482 313	670 000	65 500	30 000	95 500	765 500	840 500
Common services, supplies and equipment	2 510 607	2 303 800	145 900	437 800	583 700	2 887 500	3 117 700
Other items of expenditure							
Linguistic services[c]	(245 359)	(350 000)	(39 000)	(2 000)	(41 000)	(391 000)	(423 000)
Printing and publishing services[c]	(47 766)	(49 000)	(5 000)[a]	(1 000)[a]	(6 000)	(55 000)	(56 000)[b]
Miscellaneous	3 102 984	3 423 900	20 100[a]	34 000[a]	1 589 100	5 013 000	5 003 500[b]
Sub-total	23 583 006	26 673 000	2 426 200[a]	2 041 800[a]	6 003 000	32 676 000	36 575 000[b]
Adjustment of programme cost estimates	-	1 800 000	1 000 000	-	1 000 000	2 800 000	2 800 000
Balance of contingent financing for 1974	-	800 000	(800 000)	-	(800 000)	-	-
TOTAL	23 583 006	29 273 000	2 626 200[a]	2 041 800[a]	6 203 000	35 476 000	39 375 000[b]
Source of funds:							
Regular Budget	19 881 168	25 064 000	2 548 900	2 062 100	4 611 000	29 675 000	33 749 000
Operating Fund I	896 406	1 064 000	77 300[d]	(20 300)[d]	57 000	1 121 000	946 000
Operating Fund II	2 805 432	3 145 000			1 535 000	4 680 000	4 680 000[b]
TOTAL	23 583 006	29 273 000	2 626 200[a]	2 041 800[a]	6 203 000	35 476 000	39 375 000[b]

a/ Excluding the pro-rating of the total change in respect of Operating Fund II from 1974 to 1975 (See footnote d/ below).

b/ This figure, which assumes the same target as for 1975, is included solely for the purpose of completing the column.

c/ All the decreases shown under this sub-item of expenditure result from the fact that each amount is included twice elsewhere in the Table - once under the item Meetings, and once either entirely under Salaries and wages or partly under that item and partly under the item Common services, supplies and equipment.

d/ Since the total change of $1 535 000 is largely due to the raising in the target for voluntary contributions to the General Fund for the first time since 1972 no distribution between price and programme increases for 1975 can be made.

Major components of price increases in the budget for 1975

Table 3

Item of expenditure	Regular Budget	Operational Budget	Total
Salaries and wages	1 540 800	3 300	1 544 100
Common staff costs	510 500	13 000	523 500
Travel and meetings	88 400	26 000	114 400
Scientific services, including contracts, supplies and equipment	119 200	3 000	122 200
Common services, supplies and equipment	129 000	16 900	145 900
Other items of expenditure	(39 000)[a/]	15 100[b/]	(23 900)[b/]
TOTAL	2 348 900	77 300[b/]	2 426 200[b/]

a/ See the footnote to Table 2.
b/ Excludes Operating Fund II.

Summary of total manpower by grade

Table 4

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
DG	1	1	1	-	1	1
DDG/1G	5	5	5	-	5	5
D	19	19	19	-	19	19
P-5	89	94	94	6	100	104
P-4	124	129	129	17	146	151
P-3	103	113	113	-	113	118
P-2	48	50	50	(3)	47	43
P-1	26	27	27	(3)	24	22
Sub-total	415	438	438	17	455	463
GS	537	553	553	27	580	593
M&O	156	167	167	3	170	173
TOTAL	1 108	1 158	1 158	47	1 205	1 229

Summary of total manpower by Department

Table 5

Department	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
Office of the Director General	8	8	8	-	8	8
Department of Administration	409	421	421	13	434	437
Department of Research and Isotopes	227	232	232	8	240	246
Department of Safeguards and Inspection	120	136	136	-	136	145
Department of Technical Assistance and Publications	184	189	189	2	191	191
Department of Technical Operations	160	172	172	24	196	202
TOTAL	1 108	1 158	1 158	47	1 205	1 229

A. POLICY-MAKING ORGANS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table A.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	70 277	69 000	8 000	-	8 000	77 000	85 000
Overtime	3 967	2 500	300	1 200	1 500	4 000	4 600
Temporary assistance	6 803	5 500	700	800	1 500	7 000	8 000
Sub-total	81 047	77 000	9 000	2 000	11 000	88 000	97 600
Common staff costs	22 955	22 000	3 000	-	3 000	25 000	27 400
Common services, supplies and equipment	53 355	42 500	7 000	-	7 000	49 500	55 000
Other items of expenditure							
Linguistic services	553 895	596 000	65 000	(2 000)	63 000	659 000	725 000
Printing and publishing services	101 671	116 000	12 000	(2 000)	10 000	126 000	136 000
Other	10 001	9 500	1 000	-	1 000	10 500	11 000
TOTAL	822 924	863 000	97 000 11.2%	(2 000) (0.2)%	95 000 11.0%	958 000	1 052 000

SUMMARY OF MANPOWER

Table A.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
P-4	2	2	2	-	2	2
Sub-total	2	2	2	-	2	2
GS	3	3	3	-	3	3
M&O	-	-	-	-	-	-
TOTAL	5	5	5	-	5	5

Distribution of costs between the General Conference and the Board

Table A.3

	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
		Price	Programme	Total		
General Conference	333 000	38 000	-	38 000	371 000	408 000
Board of Governors	530 000	59 000	(2 000)	57 000	587 000	644 000
TOTAL	863 000	97 000	(2 000)	95 000	958 000	1 052 000

CHANGES IN COSTS AND MANPOWER

Costs

A.1. As will be seen from Table A.1 above, it is expected that the cost of this programme will increase by $95 000 as a net result of price increases of $97 000 partly offset by a programme reduction of $2000.

A.2. In the new presentation of the budget estimates, the costs of linguistic and printing services, which previously were shown under Salaries and wages and Common staff costs, are now shown under Other items of expenditure.

A.3. No expansion of the programme is foreseen for 1976.

Manpower

A.4. No changes in manpower are foreseen for 1975 and 1976. It will be noted that the manning table for this programme includes only the posts of the Policy-making organs services and that the manpower needed for the support services is shown in the manning table for the "Service Activities" programme.

THE PROGRAMME

A.5. The responsibility for providing the services required by the policy-making organs of the Agency, namely the General Conference and the Board of Governors, is shared by three Divisions in the Secretariat. The largest share is borne by the Division of Languages and Policy-making Organs, which undertakes all the organizational and administrative work involved, provides the language services (translation of documents and interpretation at meetings) and prepares records of proceedings. Documents are reproduced and circulated by the Division of Publications, and the Division of External Relations is responsible for providing the facilities needed for the meetings of the two organs and their committees.

A.6. It is planned to provide these services throughout the period 1975-1980 on the same lines as in the past, introducing such improvements as prove to be desirable in the light of further experience and the changing requirements of the policy-making organs themselves.

B. EXECUTIVE MANAGEMENT AND TECHNICAL PROGRAMME PLANNING

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table B.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	263 402	386 500	40 000	(17 000)	23 000	409 500	450 000
Consultants	4 295	9 000	700	6 500	7 200	16 200	13 000
Overtime	4 036	4 600	500	(800)	(300)	4 300	4 500
Temporary assistance	-	500	-	-	-	500	-
Sub-total	271 733	400 600	41 200	(11 300)	29 900	430 500	467 500
Common staff costs	86 036	123 600	13 100	(5 500)	7 600	131 200	144 700
Travel	28 595	34 000	2 500	-	2 500	36 500	39 000
Meetings							
Technical committees, advisory groups	15 841	16 000	1 000	-	1 000	17 000	18 000
Representation and hospitality	19 690	22 800	-	-	-	22 800	22 800
TOTAL	421 895	597 000	57 800 9.7%	(16 800) (2.8)%	41 000 6.9%	638 000	692 000

SUMMARY OF MANPOWER

Table B.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
DG	1	1	1	-	1	1
DDG	2	2	3	-	3	3
D	1	1	2	-	2	2
P-5	1	1	1	-	1	1
P-3	1	1	1	-	1	1
P-2	2	2	3	-	3	3
P-1	1	1	1	-	1	1
Sub-total	9	9	12	-	12	12
GS	8	8	10	-	10	10
M&O	-	-	-	-	-	-
TOTAL	17	17	22	-	22	22

CHANGES IN COSTS AND MANPOWER

Costs

B.1. As will be seen from Table B.1 above, it is expected that the cost of this programme will increase by $41 000 as a net result of price increases of $57 800 partly offset by a programme reduction of $16 800. The latter is attributable to delays in recruitment to fill vacant posts. The large increase in the cost for 1974 as compared with 1973 is due to the inclusion of the Office of the Deputy Director General for Technical Assistance and Publications, which is reflected in the 1974 adjusted budget.

Manpower

B.2. The inclusion of the Office of the Deputy Director General for Technical Assistance and Publications and the exchange of a P-5 post against a Director's post from the Division of Languages and Policy-making Organs are reflected in the adjusted manning table for 1974. One P-5 post has been transferred to this programme from Administration. No further changes are foreseen for 1975 and 1976.

THE PROGRAMME

OBJECTIVE

B.3. The objective of the Office of the Director General is to propose and implement programmes within the scope of the Agency's statutory objectives, pursuant to decisions of the Board and the General Conference and on the advice of the Scientific Advisory Committee; it is also responsible for the efficient conduct and co-ordination of the Agency's work.

B.4. The objective of the Offices of the Deputy Directors General for Research and Isotopes, for Technical Assistance and Publications and for Technical Operations is to advise and assist the Director General in matters concerning the planning and implementation of the Agency's scientific programmes; they are also responsible for the effective execution of approved programmes within their respective Departments.

C. TECHNICAL ASSISTANCE AND TRAINING

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table C.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	702 151	700 000	76 500	16 000	92 500	792 500	872 000
Consultants	10 487	24 700	1 600	4 700	6 300	31 000	34 000
Overtime	405	1 300	200	(200)	-	1 300	1 500
Temporary assistance	1 469	4 800	500	(500)	-	4 800	5 500
Sub-total	714 512	730 800	78 800	20 000	98 800	829 600	913 000
Common staff costs	229 348	226 200	26 000	5 600	31 600	257 800	280 800
Travel	38 605	56 000	3 500	(6 000)	(2 500)	53 500	59 000
Meetings							
Technical committees, advisory groups	5 040	-	-	-	-	-	-
Representation and hospitality	3 432	1 000	100	-	100	1 100	1 200
Other items of expenditure							
Linguistic services	117 786	126 000	15 000	-	15 000	141 000	156 000
Printing and publishing services	4 044	2 000	-	-	-	2 000	2 000
Other	2 805 432	3 145 000	a/	a/	1 535 000	4 680 000	4 680 000 b/
TOTAL	3 918 199	4 287 000	123 400 c/	19 600 c/	1 678 000 39.1%	5 965 000	6 092 000 b/
Source of funds:							
Regular Budget	1 112 767	1 142 000	123 400 10.8%	19 600 1.7%	143 000 12.5%	1 285 000	1 412 000
Operating Fund II	2 805 432	3 145 000	a/	a/	1 535 000	4 680 000	4 680 000 b/
TOTAL	3 918 199	4 287 000	123 400 c/	19 600 c/	1 678 000 39.1%	5 965 000	6 092 000 b/
Data processing services	1 870	4 000	-	(1 000)	(1 000)	3 000	3 000

a/ Since the total change of $1 535 000 is largely due to the raising of the target for voluntary contributions to the General Fund for the first time since 1972, no distribution between price and programme increases for 1975 can be made.

b/ This figure, which assumes the same target as for 1975, is included solely for the purpose of completing the column.

c/ Excluding the pro-rating of the total change in respect of Operating Fund II from 1974 to 1975.

SUMMARY OF MANPOWER

Table C.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
DDG	1	1	-	-	-	-
D	1	1	1	-	1	1
P-5	6	7	7	-	7	7
P-4	9	8	8	1	9	9
P-3	3	3	3	-	3	3
P-2	2	2	1	-	1	1
P-1	1	1	1	(1)	-	-
Sub-total	23	23	21	-	21	21
GS	37	37	35	-	35	35
M&O	-	-	-	-	-	-
TOTAL	60	60	56	-	56	56

CHANGES IN COSTS AND MANPOWER

Costs

C.1. In order to facilitate a comparison of the estimates for 1975 with the 1974 budget, the inclusion of the work of the Office of the Deputy Director General for Technical Assistance and Publications in part B of the programme budget - Executive Management and Technical Programme Planning [C.1] - is reflected in the column "1974 Adjusted budget" in Table C.1 above.

C.2. As will be seen from that table, it is expected that the cost of this programme under the Regular Budget will increase by $143 000 as a result of price increases of $123 400 and a programme increase of $19 600. The latter is attributable to an increase in staff cost due to the replacement of a P-1 post by a P-4 post. The total increase of $1 535 000 in the Operational Budget is attributable to an increase in the target for voluntary contributions by $1 500 000, an increase in miscellaneous income by $20 000 and an increase in Government contributions in respect of technical assistance provided by $15 000.

Manpower

C.3. The Summary of Manpower in Table C.2 above has been adjusted to reflect the exclusion of the Office of the Deputy Director General for Technical Assistance and Publications. It is proposed to transfer a vacant P-1 post to the Programme Co-ordination Section for an assistant at the P-4 level owing to the increasing work load of this Section, which has been short of one Professional post since the surrender of a P-4 post in 1972. [C.2]

THE PROGRAMME

OBJECTIVE

C.4. The objective is to promote the transfer of skills and knowledge relating to the use of nuclear energy for peaceful purposes, to support efforts to carry out nuclear energy activities more effectively and to ensure that the skills and knowledge transferred can continue to be applied after the provision of such assistance by the Agency has been completed.

RESULTS TO DATE

C.5. The Agency started to provide technical assistance in 1958. Up to the end of 1973, the Agency had made available the services of about 2100 experts and visiting professors for 80 countries, awarded some 4700 fellowships for individual study and provided equipment and supplies valued at $14 million. In addition, over 2500 persons had participated in 160 regional and interregional projects organized by the Agency. The total value of this assistance was $51 million; of this total, the Agency's own resources and gifts in kind from Member States accounted for $32.5 million, covering the provision of 1200 experts, 4000 fellowships and $7 million worth of equipment, the remainder being financed by UNDP or its predecessors [C.3]. In this context it is to be noted that in 1959, the resources available from Operating Fund II and from UNDP as well as in the form of gifts in kind, amounted to about $1.5 million.

[C.1] See paras B.1, B.2 and B.4 above.

[C.2] See document GC(XV)/460, para. V.3.10.

[C.3] The United Nations Expanded Programme of Technical Assistance and the United Nations Special Fund, which were consolidated into UNDP in 1966. Subsequent references to UNDP apply to such of the three bodies as the context requires.

PLANS FOR 1975-76

C. 6. The annual programme of assistance is drawn up on the basis of requests made by Member States and reflects the priorities their Governments themselves establish. Governments submit requests, in accordance with a system of integrated programming, for the three forms of technical assistance - experts, equipment, and fellowships and training. These three forms of assistance are co-ordinated as far as possible so as to make the maximum contribution towards development. The amount of assistance that the Agency can provide from its own resources depends, of course, on the funds and facilities made available to it for that purpose.

C. 7. During the period 1975-76, it is expected that the technical assistance programme will show increasing emphasis on the training of personnel, particularly of those who are to be involved in the introduction of nuclear power. The manpower to be trained will consist not only of engineers and other staff to operate the power stations, but also of personnel for geological surveys to prospect for and develop uranium resources and of staff for work connected with technological developments, such as the fabrication of fuel elements, that arise from nuclear power programmes. This expansion of training activites is the subject of Annex VI. Assistance will continue to be given in other sectors of economic and scientific development, such as agriculture, education, health and industry, where nuclear techniques can contribute to the achievement of objectives.

PLANS FOR 1977-80

C. 8. The training activities which are the subject of Annex VI will continue, being adapted to take account of any changes of emphasis shown to be necessary by the experience gained in 1975-76. Assistance will also continue to be given in the form of experts and equipment to meet requests by Governments, which can be expected in this period to emphasize the use of nuclear techniques in technological processes in the developing sectors of their respective economies.

CO-OPERATION WITH OTHER ORGANIZATIONS

C. 9. The Agency is executing about 15 large-scale UNDP projects, and carrying out several more in association with UNIDO and the United Nations itself. It will also continue to act as a sub-contractor in some large-scale projects for which other United Nations organizations are executing agencies.

C. 10. Links have been established with other organizations which are operating bilateral assistance programmes, such as NORAD and SIDA, with a view to increasing the funds available for developing countries that are introducing nuclear technology. The Agency will continue its joint co-operation programme financed by SIDA, in particular by sponsoring training courses of a regional or interregional nature. It is hoped to collaborate in other bilateral programmes (in field projects involving the assignment of experts and the provision of equipment).

STRUCTURE

C. 11. This programme consists of two sub-programmes, which are dealt with separately below.

SUB-PROGRAMMES

Experts and equipment

OBJECTIVE

C.12. The objective is to provide expert assistance and specialized equipment for development projects in Member States.

RESULTS TO DATE

C.13. Since the start of the programme, about 2100 experts have carried out assignments - 1200 were financed from the Agency's own resources or were provided by Member States, and 900 were financed by UNDP. There are now, on the average, about 90 experts in the field at any one time. Equipment and supplies valued at about $14 million have been provided, $7 million coming from the Agency's own resources and gifts in kind and the remainder from UNDP.

PLANS FOR 1975-76

C.14. Several developing Member States have progressed in the application of nuclear technology to the stage where they are embarking on nuclear power programmes. Their needs are reflected in requests for specialized, often short-term, assistance relating, for example, to nuclear engineering, fuel fabrication and reactor control systems, and it is expected that requests for assistance of this nature will increase. With the ever-increasing importance that is being attached in national development plans to such activities as industry and mining, many Governments are continuing or embarking on programmes of prospecting for and developing nuclear raw materials; these either constitute part of their general exploration activities for mineral resources or consist of projects specifically confined to radioactive minerals. Developing Member States are expected to emphasize the application of nuclear techniques in industry, which is expanding. It is also expected that Governments will continue to stress the need for expert assistance and equipment in connection with the application of radioisotopes and radiation in agriculture, medicine and health (including the control of environmental pollution).

C.15. The Agency will continue to try to make up for the limited financial resources available for providing technical assistance by using members of the Secretariat for expert assignments when possible, by identifying projects of a similar nature for which assistance could be given by the same expert and by arranging periodic visits of relatively short duration by advisers or staff members in preference to the long-term assignments of experts. On request, assistance will be given to Governments in formulating projects and in elaborating the necessary plans of operation; this will be done by staff members, who will, if necessary, work in conjunction with short-term specialized consultants.

PLANS FOR 1977-80

C.16. With increasing emphasis being placed by several developing Member States on the introduction of nuclear power, the trends noted in paragraph C.14 above are expected to continue. As power production programmes progress, there will be increasing need for specialists in specific processes, who will probably most appropriately be provided on short-term assignments. Close links will be established with manufacturers and others in the private sector, as well as with public utilities. Experts and equipment will continue to be required for national programmes of applied research and also for the development of higher education institutes and facilities.

Fellowships and training

OBJECTIVE

C.17. The objective is to assist Member States in building up their scientific infrastructure with a view to promoting economic and scientific development through the application of nuclear technology.

RESULTS TO DATE

C.18. Approximately 4700 fellowships have been awarded since the programme started, 4000 being provided from the Agency's own resources and under Type II offers of fellowships, and 700 being financed by UNDP. There are now approximately 350 fellows studying in host countries at any one time.

C.19. Of the 160 training courses that have been held, 72 were financed from the Agency's own funds and 88 were funded by UNDP. Every year, a number of visiting professors are made available to developing Member States and about 15-25 scientific visits are arranged.

C.20. As a result of the meetings on nuclear science teaching which were held in Bangkok in 1968, Buenos Aires in 1970 and Athens in 1973, technical reports have been published containing suggestions for topics in nuclear science for secondary schools and subjects of courses for future physicists, engineers and science teachers.

PLANS FOR 1975-1976

C.21. It is expected that between 350 and 400 fellowships will be awarded each year.

C.22. As the application of nuclear technology invariably requires instrumentation, some of it quite sophisticated, there is a growing need for personnel skilled in the repair and maintenance of instruments and equipment. It is expected that considerable emphasis will be placed by Member States on the need to train technicians who, in turn, will be able to train other technicians at the national level. The Agency hopes to sponsor, together with ILO and UNDP, a programme for training technicians and non-specialized engineers in the repair and maintenance of nuclear and electronic instrumentation. Training for middle-grade staff and laboratory technicians will be provided through training courses at the regional level. It is expected that, in addition to study tours, about 12 training courses on various aspects of nuclear energy applications will be organized yearly.

C.23. The establishment of nuclear power programmes in some ten developing Member States is in progress and it is foreseen that several other Members may embark upon nuclear power programmes in the next few years; the training of technical manpower to meet the needs of these programmes will accordingly be accelerated. It is planned to hold a major training course in nuclear power engineering and several specialized training courses oriented towards practical training in planning and constructing nuclear power plants, and in related regulatory work. This programme is described in greater detail in Annex VI.

C.24. As the establishment of a scientific infrastructure in developing countries requires a base of trained scientific personnel, the Agency expects to continue to receive requests for visiting professors to teach at universities and research institutes. As their nuclear energy programmes grow, developing countries need to study the development of nuclear science and technology in more advanced countries. Scientific visits and research fellowships will, therefore, continue to be arranged for experienced scientists from developing Member States who are responsible for promoting research in their own countries.

PLANS FOR 1977-80

C.25. The programme started in 1975-76 will continue and be expanded to meet the requirements of those Governments that by that time have decided to introduce nuclear power. Fellowships in all fields of nuclear science and scientific visits will continue to be provided. Training courses at regional and interregional levels will be organized on subjects to which Member States give priority in their development plans.

CO-OPERATION WITH OTHER ORGANIZATIONS

C.26. Assistance for a number of training courses and study tours is provided in conjunction with ILO, FAO, WHO and SIDA. Consultation with UNESCO on nuclear science teaching will continue.

D. FOOD AND AGRICULTURE

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table D.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	295 095	312 000	27 000	19 000	46 000	358 000	403 000
Consultants	16 242	19 000	1 500	-	1 500	20 500	23 000
Overtime	185	300	100	-	100	400	400
Temporary assistance	1 128	1 400	100	-	100	1 500	1 600
Sub-total	312 650	332 700	28 700	19 000	47 700	380 400	428 000
Common staff costs	96 389	100 100	9 700	6 200	15 900	116 000	129 800
Travel	21 398	26 500	1 300	-	1 300	27 800	30 000
Meetings							
Conferences, symposia, seminars	21 237	20 500	1 200	(1 700)	(500)	20 000	31 000
Technical committees, advisory groups	44 083	51 000	3 000	4 000	7 000	58 000	68 000
Representation and hospitality	1 156	2 200	300	-	300	2 500	2 800
Scientific and technical contracts	303 477	264 000	13 000	38 000	51 000	315 000	320 000
Common services, supplies and equipment	246	-	-	300	300	300	400
Other items of expenditure							
Linguistic services	68 191	73 000	9 000	-	9 000	82 000	90 000
Printing and publishing services	118 485	210 000	19 000	(40 000)	(21 000)	189 000	195 000
TOTAL	987 312	1 080 000	85 200 7.9%	25 800 2.4%	111 000 10.3%	1 191 000	1 295 000
Data processing services	18 682	22 000	1 000	1 000	2 000	24 000	30 000

SUMMARY OF MANPOWER

Table D.2

Grade of post	Number of established posts												1976 Preliminary estimate
	1973 Adjusted		1974		1974 Adjusted		Change		1975				
D	-	(1) a/	-	(1)	-	(1)	-		-	(1)			- (1)
P-5	5	(2)	5	(2)	5	(2)	1		6	(2)			6 (2)
P-4	6	(3)	6	(3)	6	(3)	-		6	(3)			6 (4)
P-3	1	-	1	-	1	-	-		1	-			1 -
Sub-total	12	(6)	12	(6)	12	(6)	1		13	(6)			13 (7)
GS	8	(6)	8	(6)	8	(6)	-		8	(6)			8 (7)
M&O	-	-	-	-	-	-	-		-	-			- -
TOTAL	20	(12)	20	(12)	20	(12)	1		21	(12)			21 (14)

a/ FAO staff in brackets.

Contribution by FAO towards the financing of the activities
of the Joint FAO/IAEA Division

Table D. 3

	Estimates 1974-75
Salaries and common staff costs for Professional staff	430 580
Consultants	38 100
Duty travel	19 660
Contractual services and equipment a/	164 300
Meetings	b/
Publications	32 900
Total	685 540

a/ Including GS staff costs.

b/ The cost, amounting to $83 100, is included under salaries and contractual services and equipment on the basis of CCAQ's expenditure classification.

CHANGES IN COSTS AND MANPOWER

Costs

D. 1. As will be seen from Table D. 1 above, it is expected that the cost of this programme will increase by $111 000 in 1975, of which $85 200 will be required to cover salary and other price increases and $25 800 will be a programme increase.

D. 2. A programme increase of $25 200 is foreseen in respect of salaries and related common staff costs for an additional Professional post at the P-5 level (for the Head of the Animal Production and Health Section). A programme increase of $38 000 for scientific and technical contracts and a small increase for meetings are expected to be offset by a decrease for printing and publishing services.

Manpower

D. 3. As will be seen from Table D. 2 above, one additional P-5 post will be required for a Section chief in view of the increased emphasis on animal production and health. No further change in the manning table is foreseen for 1976.

THE PROGRAMME

OBJECTIVE

D. 4. The broad objective is to foster applications of isotopes and radiation in food and agriculture within a joint programme of FAO and the Agency. World production of food is not increasing at a rate commensurate with population growth, and the incidence of drought, crop failures and other natural disasters has resulted in a diminution of food stocks to a level lower than at any time since the second world war. The programme aims at employing nuclear techniques to improve agricultural productivity and the quality of the produce, as well as to protect crops, livestock and food from pests, disease and spoilage. Special attention will be given in the programme to the protection and conservation of the environment.

RESULTS TO DATE

D. 5. The Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture was formed in 1964. The programme has been drawn up on the basis of consultations between FAO and the Agency and will be carried out on behalf of the two organizations. The joint programme has stimulated or resulted in the development of several improved crop varieties, better mutation breeding techniques, more efficient ways of applying phosphorus and nitrogen fertilizers, more rational use of irrigation water, large-scale production of vaccines against lungworm in sheep and goats as well as of animal feeds based on non-protein sources of nitrogen, greatly improved techniques of applying induced male sterility to selected deleterious insects, better understanding of the processes of chemical pollution in food and agriculture, as well as progress towards general acceptance and commercial use of irradiation as a means of food preservation.

PLANS FOR 1975-80

D. 6. The work is primarily concerned with the use of isotopes and radiation in the following activities:

(a) Research on plant nutrition including the role of micronutrients, efficient use of fertilizers and water, especially for cereals and legumes and physiological aspects of plant yield and grain quality;

(b) Mutation breeding for higher yield, better fertilizer response, early maturing, disease resistance and improved protein content of grains;

(c) Studies related to animal nutrition and health, with emphasis on radiation-produced vaccines against parasites, and use of non-protein nitrogen;

(d) Application of the sterile-male technique for control of noxious insects and related studies of insect physiology and ecology;

(e) Studies of pesticides and other agricultural chemicals in the environment, especially the fate and significance of residues; and

(f) Use of irradiation for the preservation and disinfestation of foods with special reference to the technological, economic, wholesomeness and legislative aspects of the problem.

D. 7. These major activities will be continued with changes in emphasis, particularly in relation to animal production and health, chemical pollution, crop species, food products, sterile insect release, and fertilizer and water practices, as indicated in the various sub-programmes.

D. 8. The activities planned for 1975-80 will be concentrated on fewer components within six sub-programmes. Work on some of the previous components has been completed and others will be phased out during the programme period. The components have been reduced from 24 to 15 and it is anticipated that a further 3-4 components will be phased out in 1975-76.

RELATED ACTIVITIES

D. 9. The related activities currently involve about 200 research contracts and agreements, under some 20 co-ordinated programmes. They also involve the provision of analytical and developmental laboratory services in the Agency's Laboratory and laboratories in Member States and irradiation services for seed samples from Member States. In regard to technical assistance, a large number of requests are expected to be serviced, six to eight training courses are foreseen and about 100 fellowships will probably be granted in the period 1975-76, subject to the availability of funds.

CO-OPERATION WITH OTHER ORGANIZATIONS

D. 10. The programme which was initiated in 1964 is carried out jointly on behalf of the Agency and FAO and involves co-operation with UNDP in regard to technical assistance, with WHO on food preservation, and also with UNEP and WHO on pollution, entomology and pest control.

STRUCTURE

D. 11. This programme consists of six sub-programmes which are dealt with separately below. It should be noted that the advisory groups mentioned in the text are referred to as expert panels in the programme of FAO.

Summary of manpower and costs

Table D. 4

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Soil Fertility, Irrigation and Crop Production	3,2(0.2)[a/]	1,4(1.2)	236 000	3,2(1.2)	1,4 (1.2)	269 200
Plant Breeding and Genetics	2,2(1.2)	1,4(1.2)	206 500	2,2(1.2)	1,4 (1.2)	234 400
Animal Production and Health	1,2(1.1)	1,4(1.1)	150 400	1,2(1.1)	1,4 (1.1)	196 800
Insect and Pest Control	2,1(1.2)	1,2(1.2)	237 000	2,1(1.2)	1,2 (1.2)	222 300
Chemical Residues and Pollution	0,2(2.1)	2,4(0.1)	146 300	0,2(2.1)	2,4 (0.1)	141 000
Food Preservation	4,1(0.2)	0,2(1.2)	214 800	4,1(0.2)	0,2 (2.2)	231 300
TOTAL	13,0(6.0)	8,0(6.0)	1191 000	13,0(7.0)	8,0 (7.0)	1 295 000

a/ FAO staff in brackets.

SUB-PROGRAMMES

Soil fertility, irrigation and crop production

OBJECTIVE

D. 12. The objective is to advise and assist Member States of the Agency and FAO in the application of radiation and isotope techniques in soil fertility, crop nutrition, irrigation and other soil and water management studies.

RESULTS TO DATE

D. 13. Many solutions to problems relating to the efficient utilization of fertilizers by rice, maize and wheat and the root distribution of various tree crops have resulted from this sub-programme. The studies of wheat fertilization have been completed successfully and the project has been phased out. Information regarding fertilizer source, placement and time of application obtained through research programmes involving the use of radiation and isotope techniques has provided the means of achieving higher crop yields more economically. The energy crisis, which is making fertilizer supplies more limited and more expensive, gives particular significance to the need for the efficient use of fertilizers,

particularly in developing countries. Information of practical value has been obtained on the improvement of the efficiency of water use through the in situ measurement of soil water, using neutron moisture meters.

PLANS FOR 1975-76

D. 14. The project on the effect of water management and nitrogen fertilizer practices on the efficiency of nitrogen fertilizer utilization by rice, which was initiated in 1970, will be phased out and replaced by one on isotope-aided micronutrient studies with particular reference to zinc deficiency in rice. The project on fertilizer efficiency studies on grain legumes will be continued, as will the project on the use of radiation and isotope techniques in studies of soil-water regimes. The sub-programme will include a project concerned with agricultural nitrogen residues with reference to their conservation and behaviour as potential pollutants. The progress of the various projects will be reviewed at research co-ordination meetings. There are plans for an advisory group meeting in 1975 and a symposium in 1976 on isotopes and radiation in soil organic matter studies, a subject which relates to all programme components.

RELATED ACTIVITIES

D. 15. The related activities involve research contracts and agreements in co-ordinated research programmes, the publication of proceedings, the training of fellows and supervision of training and the work of technical assistance experts. A regional training course on the use of isotopes and radiation techniques in soil research is proposed for 1976 for Latin America. The Agency's Laboratory will perform isotopic analyses of plant and soil samples and provide other supporting services.

PLANS FOR 1977-80

D. 16. Projects concerned with the use of isotopes to study efficient utilization of fertilizers and water by agricultural crops will continue. Fertilizer management studies of specific tree crops and other important agricultural food crops such as millet and sorghum will be undertaken. The project on soil-water regimes will be replaced by one designed to provide information on the effect of soil management and cropping systems on the water economy. A research project on the improvement of production on salt-affected (saline) soils will be initiated in co-operation with the FAO Land and Water Development Division. Consideration will be given to developing a programme on slow and controlled release fertilizers. In this project use will be made of the information and expertise developed through the soil-water and the nitrogen conservation projects. Advisory groups, symposia and training courses will be organized to support these activities.

CO-OPERATION WITH OTHER ORGANIZATIONS

D. 17. The sub-programme involves co-operation with UNDP, ESNA, IITA, ICRISAT, EAAFRO and the International Society of Soil Science.

STRUCTURE

D. 18. The components of the previous six-year sub-programme have been consolidated to give more effective direction to the work. This sub-programme now consists of three components which are described in the following paragraphs. Two deal with fertilizer use: one on cereal crops and the other on grain legumes and horticultural crops. The third component deals with soil-water regimes.

Soil fertility, irrigation and crop production

Summary by programme components

Table D. 5

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
The use of isotopes and radiation in fertilizer studies of cereals and grasses	1.1(0.1)[a/]	0.5(0.4)	42 300	-	20 000	2 000	64 300
The use of isotopes and radiation in fertilization studies of leguminous and horticultural crops	1.1(0.1)	0.4(0.4)	42 800	-	25 000	2 000	69 800
The use of isotopes and radiation techniques in studies of soil-water regimes	1.0(-)	0.5(0.4)	41 400	14 500	20 000	2 200	78 100
Linguistic, printing and publishing services	-	-	-	-	-	23 800	23 800
TOTAL	3.2(0.2)	1.4(1.2)	126 500	14 500	65 000	30 000	236 000

a/ FAO staff in brackets.

The use of isotopes and radiation in fertilizer studies of cereals and grasses

Objective

D. 19. The objective is to study the effect of water management and fertilizer practices, such as source, placement and time of application, on the efficiency of fertilizer use in rice production.

Results to date

D. 20. Results to date have shown that mid-term drainage of the rice paddy had no significant effect on the yield of grain or nitrogen uptake. Fertilizer nitrogen, on the average, was used three times more efficiently when applied at the primordial initiation stage of growth than when applied at the time of transplanting. Split applications of 100 kg N/ha, 25 kg as a basal application and 75 kg at primordial initiation, were generally the most effective in increasing grain yields.

Plans for 1975-76

D. 21. The project initiated in 1970 on the effect of water management and nitrogen fertilizer practices on the efficiency of nitrogen fertilizer utilization by rice will be completed in 1975 with the publication of a Technical Report. Future efforts will be concentrated on isotope-aided micronutrient studies, with special reference to zinc deficiencies in rice.

Related activities

D. 22. Eight to ten institutes will participate in a co-ordinated micronutrient research contract programme and services for technical assistance projects will be rendered as appropriate. Research co-ordination meetings will be held.

Plans for 1977-80

D.23. The micronutrient project is expected to continue until 1977 and the results will be published in a Technical Report in 1978. A new programme is planned for initiation in 1977 with emphasis on practical fertilizer problems relating to forage crop production.

The use of isotopes and radiation in fertilization studies of leguminous and horticultural crops

Objective

D.24. The current objective is to determine the most efficient methods of applying fertilizers to grain legume crops for maximizing production without losing the benefits of the crops' capacity to fix atmospheric nitrogen.

Results to date

D.25. Labelled fertilizer experiments have been carried out under a co-ordinated research programme to study, first, the efficiency of fertilizer phosphorus utilization from different methods of placement, secondly, the influence of starter nitrogen fertilizer on symbiotic nitrogen fixation and phosphorus utilization, and, thirdly, the influence of phosphorus on the utilization of fertilizer nitrogen and nitrogen fixation. The first results from these experiments will become available in 1974.

Plans for 1975-76

D.26. The grain legume project will be continued throughout this period with emphasis on studies on the effect of time, source, and method of application on the utilization of nitrogenous fertilizers and their effect on symbiotic fixation of nitrogen.

Related activities

D.27. Some 12 institutes will participate under contract in a co-ordinated research programme. The Laboratory will carry out some analyses of plant samples from the field experiments and support developmental research. Research co-ordination meetings will be held to plan each year's experiment.

Plans for 1977-80

D.28. The current project will be completed and phased out in 1977 and the results published as a Technical Report in 1978. Future research projects under this component are expected to include work on micronutrient problems in legume production and practical fertilizer problems relating to tree crop production.

Co-operation with other organizations

D.29. Co-operation with IITA in Nigeria is expected.

The use of isotopes and radiation techniques in studies of soil-water regimes

Objective

D.30. The current objective is to develop improved means for controlling the dynamics of soil-water in the field as a basis for better use of soil and water resources in agriculture.

Results to date

D. 31. Soil profiles have been characterized with neutron equipment and the hydraulic conductivity determined as a function of soil moisture content. The information obtained provides a reliable means of estimating the drainage component of the water balance equation. This provides a sound basis for investigations on the water requirements of crops and the movement of salts and pollutants in the soil system.

Plans for 1975-76

D. 32. The soil moisture programme will be continued throughout the period with emphasis on utilization of the neutron moisture meter in order to improve soil-water use efficiency. An advisory group meeting will be held in 1975 to review the results obtained and to make recommendations concerning future projects under this component.

Related activities

D. 33. Some 12 institutes will participate in a co-ordinated research programme. In addition, support in the implementation of several related technical assistance projects is expected to be provided. Work will also be done on the project concerned with the fate of agricultural nitrogen residues as potential pollutants, [D. 1] in co-operation with FAO.

Plans for 1977-80

D. 34. The current project will be completed and phased out in 1977 and the results published as a Technical Report in 1978. Subject to the recommendations of an advisory group in 1977, future projects may be concerned with the management of saline soils and water management practices for dry land farming conditions.

Co-operation with other organizations

D. 35. Co-operation with UNDP in the project entitled "Middle East Regional Applied Research Programme", and possibly with ICRISAT, is foreseen.

Plant breeding and genetics

OBJECTIVE

D. 36. The objective is to assist and advise Member States of the Agency and FAO on the use of radiation and isotope techniques for genetic improvement of crop plants.

RESULTS TO DATE

D. 37. The practical value of induced mutations for plant improvement has been clearly demonstrated. In more than 20 countries plant breeders have developed, by using induced mutations, improved crop varieties, some as a result of FAO/IAEA programmes. These varieties are improved in such characters as yield, straw strength, earliness and disease resistance.

PLANS FOR 1975-76

D. 38. The provision of assistance and advice to Member States will continue by means of correspondence, missions, training, conferences and publications. It is planned to hold a symposium, a training course and an advisory group meeting in 1975, and another advisory

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[D. 1] See para. D. 113 below.

group meeting in 1976 to be financed by FAO. The advisory group meeting in 1975 will be convened to review the current sub-programme and to suggest the direction of future activities. The research contract programme will focus on the development of more efficient and economic systems of induction, selection and utilization of mutations. This development is needed particularly for certain breeding purposes, such as improving grain nutritional quality and disease resistance, as well as for certain crop species, such as cross-pollinated plants, vegetatively propagated plants and woody perennials. This work will also be reviewed at research co-ordination meetings.

RELATED ACTIVITIES

D. 39. The related activities involve research contracts and agreements in co-ordinated research programmes and the provision of services in relation to experts and fellowships under the technical assistance programme. The Laboratory will continue to provide assistance in mutagenic treatments and in screening for mutants. The Federal Republic of Germany supports a large research programme on grain protein improvement, and SIDA finances a number of research contracts concerned with disease resistance in crop plants.

PLANS FOR 1977-80

D. 40. The efforts to increase crop yields and ensure yield stability will continue. More emphasis will have to be placed on important, but so far neglected, groups of crop plants such as grain legumes, as well as on crop quality for human and animal nutrition. Consideration will be given to development of a project on the use of induced mutations for insect resistance. [D. 2] Special attention will be paid to the development of more advanced techniques of mutation induction and utilization which take into consideration modern trends in cytogenetics and molecular biology, and appropriate use will be made of the potential offered for genetic manipulation through single cell and tissue culture techniques. As natural genetic resources will be increasingly exploited, induced genetic variability will become more and more indispensable for further plant improvement. Close co-operation between the Agency and the International Network of Genetic Resources Centres is envisaged for the timely supplementation of preserved genetic resources by induced mutations. It is planned to hold a symposium to foster the exchange of information on new achievements in mutation breeding, and at least one training course.

CO-OPERATION WITH OTHER ORGANIZATIONS

D. 41. It is expected that the sub-programme will involve co-operation with UNDP, EUCARPIA, ESNA, WARDA, EPPO, the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT) (the International Centre for the Improvement of Maize and Wheat), the Centro Internacional de Agricultura Tropical (CIAT) (International Centre for Tropical Agriculture), ICRISAT, IITA, IRRI, SIDA, the Gesellschaft für Strahlen- und Umweltforschung (GSF) (the Association for Radiation and Environmental Research) and US-AID.

STRUCTURE

D. 42. The components of the previous six-year sub-programme have been consolidated to strengthen the emphasis on crop improvement and mutation breeding techniques and also on grain protein improvement. The sub-programme now consists of three components which are described in the following paragraphs.

[D. 2] See para. D. 84 below.

Plant breeding and genetics

Summary by programme components

Table D. 6

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Grain protein improvement through nuclear techniques	1. 1(0. 5)[a/]	0. 7(0. 4)	44 300	-	-	-	44 300
Development of mutation breeding techniques	0. 6(0. 3)	0. 3(0. 4)	23 600	10 000	25 000	2 700	61 300
The use of induced mutations for crop improvement	0. 5(0. 4)	0. 4(0. 4)	19 600	-	30 000	2 800	52 400
Cost of meetings not attributable to an individual programme component	-	-	-	14 500	-	300	14 800
Linguistic, printing and publishing services	-	-	-	-	-	33 700	33 700
TOTAL	2. 2(1. 2)	1. 4(1. 2)	87 500	24 500	55 000	39 500	206 500

a/ FAO staff in brackets.

Grain protein improvement through nuclear techniques

Objective

D. 43. The current objective is to help to alleviate protein nutritional deficiencies by developing techniques for improving the protein content of food plant grains.

Results to date

D. 44 A co-ordinated research programme was initiated in 1970, essentially financed by the Federal Republic of Germany. This component is integrated with work involving plant breeding, plant physiology, analytical chemistry and nutrition. Results are already to hand which indicate that several crop varieties with improved protein and lysine arising from induced mutations are likely to become available to farmers within the next few years.

Plans for 1975-76

D. 45. The work under research contracts will consist of determining the kind and frequency of mutations altering protein content, developing better analytical methods to detect the mutations and selecting mutants with improved protein. The mutants are to be checked for yielding capacity and other agronomic characteristics and their nutritional quality for humans. The work will also include studies on how nitrogen supplies are transformed in plants into protein.

Related activities

D. 46. This component involves work under some 22 research contracts and agreements and associated activities in a number of institutions in the Federal Republic of Germany. Research co-ordination meetings are held and services are provided for technical assistance and training. The Agency's Laboratory contributes research and training on methodology and provides assistance in protein analysis to contractors.

Plans for 1977-80

D.47. Emphasis will shift from induction and isolation of mutants to complete evaluation of mutants with regard to yield, disease resistance, nutritional and other qualities. There will be an increasing amount of work on legumes as a source of protein for human and animal nutrition. A symposium is planned to be held in 1978 - jointly organized by FAO, the Agency and GSF - subject to the availability of funds.

Co-operation with other organizations

D.48. There will be co-operation with IITA, ESNA, EUCARPIA, SABRAO, GSF and US-AID.

Development of mutation breeding techniques

Objective

D.49. The current objective is to increase the efficiency of mutation breeding techniques, adapt mutation breeding techniques to further crop species, develop better screening techniques for induced mutations and incorporate modern developments in molecular biology, cytogenetics and biochemistry into mutation breeding.

Results to date

D.50. A co-ordinated research programme on the improvement of techniques was started in 1972. The preliminary results include the development of appropriate treatment techniques for some of the new and highly effective mutagens and demonstrate that there is a certain specificity of effects through mutagenic treatments in particular stages of the cell cycle. Progress has been achieved in developing better screening techniques for disease resistance and in understanding host/pathogen relationships.

Plans for 1975-76

D.51. The co-ordinated research programme on improvement of mutation breeding techniques will continue. An international symposium in 1975 will allow a world-wide review to be made of the status of mutation breeding techniques. An advisory group meeting financed by FAO will be held in 1976 to assess the direction that a new research programme to be implemented in 1977/78 should take. The research programme on mutation breeding for disease resistance, which is financed essentially by SIDA, will continue until 1976 with emphasis on developing means for breeding crop varieties with long-lasting disease resistance.

Related activities

D.52. There will be some 25-30 research contracts and agreements. Services will be provided in relation to experts and fellowships under the Agency's technical assistance programme. A training course is planned for 1975.

Plans for 1977-80

D.53. The co-ordinated research programme on mutation breeding techniques will be terminated in 1977 and a new project will be initiated in the light of the problems encountered in making maximum use of induced mutations for crop plant improvement. A co-ordinated research programme on mutation breeding for resistance to insect and nematode attack may be initiated. [D.3] It is likely that in vitro culture techniques in the case of crop plants will have developed to a stage where the initiation of a research programme on in vitro mutation breeding is justified.

[D.3] See para. D.84 below.

Co-operation with other organizations

D. 54. This component may involve co-operation with EUCARPIA, SABRAO, EURATOM, EPPO, SIDA and ESNA.

The use of induced mutations for crop improvement

Objective

D. 55. The current objective is to improve selected crop species by inducing mutations with a view to achieving important agronomic advantages, such as higher yielding capacity, disease resistance and lodging resistance, and to provide the means for such improvements.

Results to date

D. 56. Related projects in the past yielded many superior mutant lines of rice, barley and wheat, several of which were developed into commercially grown varieties. Durum wheat mutants were tested internationally in Mediterranean and Middle East countries and showed adaptability to specific ecological conditions. A project to develop the means for the improvement of vegetatively propagated plants and woody perennials through induced mutations was initiated in 1973, the relevant results from which cannot be expected before 1975.

Plans for 1975-76

D. 57. Emphasis will be placed on research concerning the induction, isolation and selection of mutations in somatic tissue in order to open up new possibilities for improving vegetatively propagated crop plants. A project on the use of induced mutants in rice breeding and production may be phased out in 1975. In other projects attention will be paid primarily to the elimination of specific shortcomings of otherwise suitable crop varieties. Superior mutants resulting from these projects will be tested in international trials together with varieties developed by other techniques. They will also be included in the computerized genetic resources information system provided by FAO in co-operation with the International Network of Genetic Resources Centres.

Related activities

D. 58. There will be some 30-35 research contracts and agreements. The results will be reviewed at co-ordination meetings. Some experts will probably be requested, and several fellows will be trained under the Agency's technical assistance programme. Exchange of seeds of mutant lines and of mutant clones will be arranged.

Plans for 1977-80

D. 59. After the termination of the current rice project in 1975 emphasis may be shifted towards other crops such as millet, sorghum, vegetables, fruits, oil crops or forage plants. The co-ordinated research programme on mutation breeding of vegetatively propagated crops and woody perennials will continue until 1978 when a review will be made to determine achievements and the direction of future emphasis in the programme.

Co-operation with other organizations

D. 60. This component may involve co-operation with WARDA, SABRAO, EUCARPIA, the International Network of Genetic Resources Centres, and international research institutes such as IRRI, CIMMYT, IITA and CIAT.

Animal production and health

OBJECTIVE

D. 61. The objective is to assist and advise Member States of the Agency and FAO in the use of nuclear techniques for the solution of problems in animal production associated with nutrition, adaptation and parasites.

RESULTS TO DATE

D. 62. An understanding of metabolic disorders and mineral requirements of domestic animals has been gained for major and trace elements from studies with tracers and activation analyses. Tracer-aided studies have facilitated measurements of the amount of protein synthesized by rumen bacteria and protozoa with a view to increasing it by dietary manipulations. Commercial applications of radiation-attenuated vaccines for lungworm in sheep and cattle have commenced in India and Yugoslavia.

PLANS FOR 1975-76

D. 63. Co-ordinated studies of dietary factors associated with maximizing the synthesis of protein by ruminants will continue and a research co-ordination meeting will be held. A project will be initiated to relate water-turnover in tropical herbivores to their water requirements, productive functions and adaptation to a variety of ecological zones. Commencement of a project on tracer-aided studies of meat and milk production in buffalo in South-East Asia is expected. The studies which aim to achieve immunological control over parasitic diseases of livestock (particularly in Africa and including helminthic and protozoal diseases) will continue, and there will be further field applications of radiation-attenuated vaccines in selected areas. Two advisory group meetings (one in 1975 financed by FAO, and one in 1976), one symposium in 1975, one seminar in 1976, and two training courses are planned. The subject of the symposium will relate to two programme components.

RELATED ACTIVITIES

D. 64. Co-ordinated research contract programmes and technical assistance projects in the above topics and training courses in animal nutrition, applied physiology and animal diseases are foreseen for this period.

PLANS FOR 1977-80

D. 65. A project will be developed to assess the nutritive value of roughages and lignified plant material, treated by physical, chemical or biological means, as a source of energy for ruminant diets. This will be linked to the present project on protein synthesis in the rumen, which may also be extended to include metabolic aspects of protein and amino acids. The application of radioimmunoassay techniques to the study of environmental adaptation and fertility in domestic animals will be reviewed and their use in selective breeding and disease control programmes tested under practical conditions. The possibilities of radiation-attenuated vaccines in the treatment of non-parasitic diseases of economic importance will be investigated.

CO-OPERATION WITH OTHER ORGANIZATIONS

D. 66. Co-operation with UNDP and the newly established ILRAD and ILCA, in Addis Ababa, is foreseen.

STRUCTURE

D. 67. This sub-programme consists of two components which are described in the following paragraphs.

Animal production and health

Summary by programme components

Table D. 7

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Isotope techniques in animal nutrition and physiology	0.6 (0.5)[a]	0.7 (0.6)	25 200	-	25 000	2 000	52 200
Isotopes and radiation in animal parasitology and disease	0.6 (0.6)	0.7 (0.5)	26 800	-	25 000	2 000	53 800
Cost of meetings not attributable to an individual programme component	-	-	-	10 000	-	700	10 700
Linguistic, printing and publishing services	-	-	-	-	-	33 700	33 700
TOTAL	1.2 (1.1)	1.4 (1.1)	52 000	10 000	50 000	38 400	150 400

a/ FAO staff in brackets.

Isotope techniques in animal nutrition and physiology

Objective

D. 68. The objective is to improve animal production by using isotopes in studies of nutrition and the physiological aspects of adaptation.

Results to date

D. 69. This component was initiated in 1972. In a previous five-year project the metabolism and kinetics of major and trace minerals were studied in order to recognize and avoid limitations of livestock production caused by nutrient deficiencies, imbalance and oversupplies. The results are described in a number of scientific publications. A training manual has been prepared. Various techniques have been developed and applied in the measuring of rumen microbial protein synthesis.

Plans for 1975-76

D. 70. A co-ordinated research contract programme dealing with the use of isotopes in studies of non-protein nitrogen and pre-treated proteins in high-energy diets for ruminants, which permits the quantitative assessment of protein synthesis in the ruminant's forestomach, will continue. A research co-ordination meeting is planned for 1975, to be held simultaneously with an advisory group meeting financed by FAO. Bilateral funds have been obtained for a programme to relate water-turnover measurements in tropical herbivores (using tritiated or deuterated water) to their water requirements, productive functions and adaptation to various ecological zones. Efforts to bring about improved nutrition with a view to increasing buffalo productivity is highly desirable and funds for this purpose are being sought. A training course in animal production is planned to be held during the period.

Related activities

D.71. Some 20-24 institutes working under research contracts and agreements will be participating in co-ordinated research programmes. Animal nutrition and physiology aspects are being studied in UNDP projects in Cuba and India, and projects in other countries are pending. The Laboratory will carry out nitrogen-15 analyses.

Plans for 1977-80

D.72. The techniques employed and results obtained in the present project on microbial protein synthesis will be used to assess the nutritive value of roughages and lignified plant material, treated by physical, chemical or biological means. Special attention will be paid to roughages and other agricultural by-products in developing countries. Buffalo and cattle will be the main species studied, but camels may be included because of their value in parts of Sahelian Africa. The use of radioimmunoassay techniques to assess environmental adaptation and fertility in domestic animals in harsh environments will be investigated and the possibility of their application to selective breeding programmes explored.

Co-operation with other organizations

D.73. Co-operation with ILCA and UNDP is foreseen.

Isotopes and radiation in animal parasitology and disease

Objective

D.74. The objective is to develop radiation and tracer techniques for application in the production of vaccines against parasitic diseases and in studies on their etiology, pathogenesis and immunology.

Results to date

D.75. Under this component, which was initiated in 1966, effective and safe radiation-attenuated vaccines have been developed and applied in large field trials in India and Iraq against lungworm in sheep and goats. In laboratory and field tests such vaccines have provided various degrees of immunity against some protozoal diseases and helminthic infestations. Diagnostic improvements have been made with regard to schistosomiasis and new pathogenic and immunological findings have been reported.

Plans for 1975-76

D.76. With regard to the preparation of radiation-attenuated vaccines, it is planned to continue studies in countries where the above-mentioned diseases are endemic and to carry out large-scale screening and field tests with vaccines which are now being developed. In the newly established co-ordinated research programme, more emphasis will be placed on problems of immunity and etiology, since highly sensitive and accurate tracer methods are now becoming available. It is proposed to convene an advisory group on animal parasitology and immunology in 1976. It is proposed to hold a seminar on the use of nuclear techniques in parasitic diseases in 1976 in association with the Division of Life Sciences, and a training course in this subject is also proposed.

Related activities

D.77. The related activities involve the award of 12-25 research contracts and agreements. Support will be provided for technical assistance projects in several countries, and there have been many requests for assistance related to the lungworm vaccine.

Plans for 1977-80

D. 78. Further efforts will be made to develop immunological control over various parasitic and non-parasitic diseases of economic significance. Field testing and application of diagnostic procedures and newly developed vaccines will be made in selected areas. Consideration will be given to the development of radiation-attenuated vaccines against non-parasitic diseases which particularly affect fertility in livestock.

Co-operation with other organizations

D. 79. Co-operation with UNDP and ILRAD is foreseen.

Insect and pest control

OBJECTIVE

D. 80. The objective is to assist and advise Member States of the Agency and FAO on the development of programmes of insect and pest control involving radiation and isotopes. The current programme is devoted to insect control.

RESULTS TO DATE

D. 81. Control of the Mediterranean fruit fly by the sterile-male technique has been technically proven in several large field demonstrations which have led to continuing programmes in the countries concerned. Rearing of the Mediterranean fruit fly, olive fly and codling moth has been improved and ecological data have been gathered on Heliothis and the codling moth. Tsetse fly rearing has been improved and new irradiation techniques have been developed.

PLANS FOR 1975-76

D. 82. Development research will be carried out on the sterile-male technique for control of the Mediterranean fruit fly. Work on the olive fly, tsetse fly and codling moth will be continued through research on specific topics in co-ordinated research programmes and in the Laboratory. The Information Circular on Radiation Techniques and their Application to Insect Control will continue to be published. Advisory group meetings, consultant group meetings and research co-ordination meetings will be held on various aspects of the work. A new project on isotope and radiation applications in pest management is planned.

RELATED ACTIVITIES

D. 83. Research contracts and agreements will be awarded within the framework of co-ordinated programmes. The Laboratory will conduct research and train fellows. A training course is proposed for 1975 and a study tour is planned for 1976. Publication of panel proceedings will continue. Projects for which technical assistance is requested by Member States will be supervised and serviced.

PLANS FOR 1977-80

D. 84. Emphasis may shift to other insects where developmental work indicates a high chance of successful control by the sterile-male technique. A symposium, training courses, advisory group meetings and research co-ordination meetings and consultant group meetings are foreseen. Increased emphasis on the use of radioisotopes in ecology and radiolabelled insecticides is expected. The possibility of expanding development of

genetic control of insects and mutation breeding for plants resistant to insect attack will be critically examined. [D.4]

CO-OPERATION WITH OTHER ORGANIZATIONS

D.85. The sub-programme involves co-operation with UNDP, WHO, UNEP, ESNA, ICIPE, IOBC, IBP, EPPO, USDA and GSF.

STRUCTURE

D.86. The components in the previous six-year programme have been consolidated to reflect both the discontinuation of the work on rice stem borers, the shift in emphasis to plant-feeding insects and the newer concept of pest management. Great emphasis continues to be placed on tsetse flies and other biting insects. This sub-programme consists of three components which are described in the following paragraphs.

Insect and pest control

Summary by programme components

Table D.8

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
The development of the sterile male technique against plantfeeding insects	0.8 (0.4)[a/]	0.4 (0.3)	30 600	-	20 000	2 400	53 000
The development of the sterile male technique against tsetse and other biting flies	0.7 (0.5)	0.4 (0.4)	26 700	-	30 000	2 600	59 300
Use of isotopes and radiation in developing pest management	0.6 (0.3)	0.4 (0.5)	25 200	14 500	10 000	1 300	51 000
Linguistic, printing and publishing services	-	-	-	-	-	73 700	73 700
TOTAL	2.1 (1.2)	1.2 (1.2)	82 500	14 500	60 000	80 000	237 000

a/ FAO staff in brackets.

The development of the sterile-male technique against plant-feeding insects

Objective

D.87. The objective is to develop the sterile-male technique for control or eradication of several plant-feeding insects.

Results to date

D.88. The sterile-male technique has been proven effective for control of the Mediterranean fruit fly. The rearing of the Mediterranean fruit fly and olive fly have been improved. Handling and release techniques for the Mediterranean fruit fly have been perfected and their cost reduced. A new diet has been developed for the codling moth. Ecological data have been gathered on Heliothis in Latin America and on the codling moth

[D.4] See paras D.40 and D.53 above.

in Europe. The rice stem borer programme has been terminated because progress was too slow to ensure practical results in the immediate future.

Plans for 1975-76

D. 89. Technical support will be provided for control of certain insects by the sterile-male technique on a commercial scale, when this has already been shown experimentally to be feasible. It is expected that these operations will involve the Mediterranean fruit fly in Cyprus, Israel, Italy, Peru and Spain, the olive fly in Greece and Yugoslavia, and the codling moth in Hungary and Poland. The co-ordinated research programme on Heliothis will be terminated. It is proposed to hold research co-ordination meetings about every 18 months.

Related activities

D. 90. Twenty to twenty-five institutes will participate with research contracts or agreements in three or more co-ordinated research programmes. Support services will be provided for various technical assistance projects.

Plans for 1977-80

D. 91. Depending on recommendations by advisory groups, additional plant-feeding insects will be considered for inclusion in this component, as developmental work on those under study is completed.

Co-operation with other organizations

D. 92. The component involves co-operation with UNDP, IBP, EPPO and IOBC.

The development of the sterile-male technique against tsetse and other biting flies

Objective

D. 93. The objective is to develop the sterile-male technique for eradication or control of the tsetse fly.

Results to date

D. 94. Tsetse fly rearing on membranes has been improved and new handling techniques have been developed. Ecological data on stable flies have been gathered and improved rearing methods developed. Improved techniques for irradiating flies have also been developed.

Plans for 1975-76

D. 95. Research on the mass rearing of the tsetse fly without living hosts will continue. Ecological studies on tsetse flies will be conducted in African countries, particularly through research contracts. It is proposed to hold a training course on tsetse fly rearing in 1975, an advisory group meeting financed by FAO in 1976 and research co-ordination meetings every 12-18 months.

Related activities

D. 96. About ten institutes with research contracts or agreements will participate in co-ordinated research programmes.

Plans for 1977-80

D. 97. Depending on results obtained in mass rearing and ecological studies, one and possibly more large-scale tsetse fly control programmes will be carried out; the most likely countries include Nigeria, Tanzania and Upper Volta.

Co-operation with other organizations

D. 98. The component involves co-operation with WHO, UNEP and ICIPE.

Use of isotopes and radiation in pest management

Objective

D. 99. The objective is to solve specific problems within the context of pest management programmes, that is programmes involving insect control operations carried out over a large area by an appropriate organization and not by individual farmers. In addition to the use of the sterile-male technique, the following methods will be used to achieve this objective:

(a) The use of labelled insecticides to determine the optimum timing and techniques of applications;

(b) The use of radioisotopes to study insect ecology and populations;

(c) Mutation breeding to develop varieties of plants resistant to insect attack, as part of the sub-programme on plant breeding and genetics; and

(d) Development of genetic methods of insect control, in co-operation with the Division of Life Sciences. This component will be developed in close co-operation with the Plant Production and Protection Division of FAO.

Results to date

D. 100. Work under this component has not yet started.

Plans for 1975-76

D. 101. An advisory group meeting will be convened in 1975 to advise on the development of the component in general. An advisory group will be convened, jointly with the Division of Life Sciences, in 1976 to advise on the use of genetic control of insects, and an advisory group, jointly with the Plant Breeding and Genetics Section, to advise on mutation breeding for resistance to insects in 1976.

Related activities

D. 102. About eight institutes will be awarded research contracts or agreements within a co-ordinated research programme. Several of these institutes will be located in regions where noxious insects are prevalent so that their efforts to suppress the pests can be rapidly integrated in a pest management project.

Plans for 1977-80

D. 103. Provided satisfactory progress has been made, field demonstrations of pest management will be conducted by growers' associations or governmental agricultural organizations under the sponsorship of FAO.

Co-operation with other organizations

D. 104. This component will involve co-operation with WHO, UNEP, ESNA and IOBC.

Chemical residues and pollution

OBJECTIVE

D.105. The objective is to assist and advise Member States of the Agency and FAO in the application of isotope tracer and radioassay techniques in research on pollution in agriculture and chemical and radioactive contamination of food.

RESULTS TO DATE

D.106. This sub-programme has provided useful information on the distribution, chemical fate and biological significance of a number of potentially hazardous substances in food and agriculture such as pesticide residues, heavy metals, persistent organochlorine compounds and radionuclides. Such information is essential for the development of international recommendations for the control and assay of foreign chemical and radioactive residues in food, agriculture and fishery products.

PLANS FOR 1975-76

D.107. Current co-ordinated research programmes on a widely representative range of residues in food and in the agricultural environment will be phased out. The related co-ordinated research programmes dealing with the biological side effects of selected agrochemical residues and with nitrogen residue problems will be continued. Two new projects will be initiated. The first will consist of the evaluation of the role of micro-organisms in the degradation of selected chemical residues in soil and water, and the second will deal with the appearance, fate and significance of undesirable chemical residues in oil seeds and their products as dietary constituents in developing countries. An advisory group meeting financed by FAO will be held in 1975 on the application of nuclear techniques in studies of inland water eutrophication problems in collaboration with the FAO Divisions concerned. It is proposed to organize a seminar in 1976 in collaboration with FAO, WHO, UNEP, UNESCO and ISO (subject to further consultation) on terminology and definitions in relation to the study and control of chemical and radioactive contamination of food, agriculture and fisheries, with a view to the compilation of an international glossary. It is proposed to convene an advisory group on problems of availability and supply of isotopically labelled compounds for the study of food, agriculture and fisheries in 1976.

RELATED ACTIVITIES

D.108. Research contracts and agreements will be awarded under the co-ordinated research programmes. Support services will be provided for technical assistance projects. Training will continue to be provided through fellowships, and a training course will be proposed for 1976.

PLANS FOR 1977-80

D.109. Training courses and co-ordinated research programmes will be implemented. Particular attention will be given to the application of nuclear techniques in the study and control of the problems of inland water pollution by agrochemicals and of food by the newer pesticides, and to the development of radiometric techniques for the study and evaluation of toxicological and undesirable side effects of foreign chemical residues. The compilation and publication of unique, comparative information on the fate and significance of foreign chemical and radioactive residues in food and agriculture will continue.

STRUCTURE

D.110. This sub-programme consists of two components which are described in the following paragraphs.

Chemical residues and pollution

Summary by programme components

Table D. 9

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Isotopic tracer-aided studies of the origin, fate and biological significance of foreign chemical residues in food and the agricultural environment	0,1(1.2)[a/]	1,2(0.1)	14 300	-	30 000	1 900	46 200
Collection and dissemination of comparative information on the fate and significance of foreign substances (including radioactive substances) in food and agriculture	0,1(0.9)	1,2(-)	15 200	-	10 000	1 400	26 600
Linguistic, printing and publishing services	-	-	-	-	-	73 500	73 500
TOTAL	0,2(2.1)	2,4(0.1)	29 500	-	40 000	76 800	146 300

a/ FAO staff in brackets.

Isotopic-tracer-aided studies of the origin, fate and biological significance of foreign chemical residues in food and the agricultural environment

Objective

D. 111. The objective is to obtain quantitative information on the origin, persistence and chemical fate of foreign substances (pesticides and other agrochemicals, toxic metals, organohalogen compounds, radionuclides, etc.) and their biological significance in food and the agricultural environment. Such information is essential for the formulation of international recommendations regarding the control of food and agricultural contamination, the protection of human consumers and wild-life, the effective use of agrochemicals and the development of monitoring programmes.

Results to date

D. 112. Quantitative information has been obtained on the distribution, persistence, chemical degradation and metabolism in crop plants, animals, soil and water of a number of foreign chemicals such as pesticides (chlorinated hydrocarbon and organophosphorus insecticides, phenoxy herbicides, etc.), toxic metals (mercury, cadmium, lead, etc.) and persistent organic substances (e.g. polychlorinated biphenyls) and on the behaviour of radioactive contaminants of food and agriculture. Examples are the concentration by aquatic organisms and by food crops of mercury as a contaminant in agriculture and fisheries, and the magnitude of phosphine residues in fumigated cereals. Techniques have been developed and improved for the determination of toxic residues in food by radio-activation analysis.

Plans for 1975-76

D. 113. On the basis of the results obtained, co-ordinated investigations will be concentrated on more specific problems already identified, e.g. on the appearance and fate of foreign chemical residues in oil seeds and their products as dietary constituents in developing countries and, with the Land and Water Division of FAO, the conserving of agricultural nitrogen residues as fertilizers and determination of their potential as ground

water pollutants. Needs arising from the FAO/WHO programme on pesticide residues will be taken into account. A co-ordinated programme of isotopic-tracer-aided studies on the interaction of foreign chemical residues in food and agriculture with living organisms will be continued and evaluated. Its objective will be to study the biochemical and toxicological mechanisms involved, with particular reference to the development of laboratory in vitro techniques which can obviate the need for tests with experimental animals in vivo, which are often expensive and unsatisfactory. It is planned to convene an advisory group meeting and a seminar in 1976.

Related activities

D.114. Research contracts and agreements will be awarded to selected institutes on the basis of about ten investigations within each co-ordinated programme.

Plans for 1977-80

D.115. Foreign chemicals and radioactive residues in food and agriculture are a continuing and growing problem. Particular attention will be given to the behaviour in food and the environment of the newer pesticides which are being introduced as substitutes for the earlier persistent ones, problems of inland water and fisheries contamination, and the potential value of radiometric laboratory tests for the evaluation of toxic hazards and undesirable biological effects of foreign chemical residues.

Co-operation with other organizations

D.116. This component will involve continuing co-operation and the exchange of information with IUPAC, WHO, UNESCO and UNEP.

Collection and dissemination of comparative information on the fate and significance of foreign substances (including radioactive substances) in food and agriculture

Objective

D.117. The objective is to provide a simple, uniform and concise basis for the comparative review of foreign chemicals (including radioactive substances) which appear in food, the environment and tissues of organisms. This information is presented in the form of comparative summaries and is essential in identifying problems and priorities in the development of the joint FAO/IAEA programme on chemical residues and pollution.

Results to date

D.118. Expert panel recommendations and wide interest in those summaries which are issued under the title "Joint FAO/IAEA Summaries: Foreign Chemical and Radioactive Residues in the Biosphere" have led to an arrangement for their cost-free publication in the international journal "Chemosphere".

Plans for 1975-76

D.119. Activities will be continued along the lines already recommended by expert panels and on the basis of the information gained through the co-ordinated research programmes.

Related activities

D.120. Systematic surveys of selected literature will be carried out and information will be collected through correspondence with voluntary collaborators on a world-wide basis.

Plans for 1977-80

D.121. In view of the existing and growing interest in the collection, interpretation, condensation and publication of selected information it is planned to expand this activity.

Co-operation with other organizations

D.122. This component involves co-operation with several United Nations and other international and national organizations concerned with the collection, storage and retrieval of environmental information.

Food preservation

OBJECTIVE

D.123. The objective is to facilitate the practical use of food irradiation where this produces a wholesome product and offers clear economic and technological advantages. Achievement of international public health acceptance of the process of food irradiation is one of the main long-term goals.

RESULTS TO DATE

D.124. A number of specific applications of ionizing radiations to preserve agricultural produce and food have been shown to be technologically important and potentially capable of increasing the world's food supplies. These applications include the inhibition of sprouting (as in potatoes, yams, onions, soybeans), disinfestation, quarantine treatment of agricultural and marine products (grain, beans, fruits, fishery products, etc.) and extension of the market life of perishable foods (fish, fruits, other high-water-activity products). At present 19 food items distributed over 14 countries have been given limited or unlimited public health clearance. Basic research in microbiological and biochemical contamination of food ingredients has been phased out of the programme.

PLANS FOR 1975-76

D.125. Two co-ordinated research programmes will concentrate on the technological and economic feasibility and on the public health aspects of the process of food irradiation, with special reference to the preservation and quarantine control of fish, grain, fruit and vegetables. Special missions will advise Member States, upon request, on the organization and conduct of irradiation work on food and feed. A training course in the technology and economics of food irradiation is planned for 1975 or 1976 with the aim of training operators for food irradiation facilities. It is planned to convene an advisory group in 1975 and an IAEA/FAO/WHO experts' meeting in 1976.

RELATED ACTIVITIES

D.126. Research contracts and agreements will be concluded within co-ordinated research programmes. Support services will be provided for technical assistance projects. Information will continue to be provided to Member States, upon their request, concerning national legislation on the licensing of irradiated food for human consumption, together with data relating to the wholesomeness of such food.

PLANS FOR 1977-80

D.127. The work will mainly deal with the practical introduction of food irradiation in Member States. The international acceptance of the process of food irradiation by public health authorities will be a subject for discussion at seminars and advisory group meetings.

CO-OPERATION WITH OTHER ORGANIZATIONS

D.128. Co-operation with WHO, OECD (NEA) and the Codex Alimentarius Commission of the Joint FAO/WHO Food Standards Programme on wholesomeness problems is an important part of this sub-programme. Collaboration with the Commission of the European Communities and CMEA on technological and food legislation matters is also an essential part of the work planned. This sub-programme involves co-operation with international scientific societies and unions such as ESNA, the International Union of Food Science and Technology and IUPAC in the scientific and public relations aspects of the work.

STRUCTURE

D.129. This sub-programme has been restructured to reflect the phasing out of the basic microbiological and biochemical research work and now consists of two components which are described in the following paragraphs.

Food preservation

Summary by programme components

Table D.10

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Technological and economic feasibility of food irradiation	2,1(0.1)[a]	0,1(0.5)	59 000	14 500	30 000	2 300	105 800
Public health acceptance and legal aspects of the process of food irradiation	2,0(0.1)	0,1(0.7)	59 400	-	15 000	2 000	76 400
Linguistic, printing and *publishing services*	-	-	-	-	-	32 600	32 600
TOTAL	4,1(0.2)	0,2(1.2)	118 400	14 500	45 000	36 900	214 800

a/ FAO staff in brackets.

Technological and economic feasibility of food irradiation

Objective

D.130. The objective is to collaborate in the implementation of projects for shelf-life extension of important food items.

Results to date

D.131. The results of technical feasibility studies in small-scale experiments showed the potential advantages of irradiation in processing a number of food items of appreciable economic importance.

Plans for 1975-76

D.132. Under the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology between the Agency and Member States [D.5] assistance will be given to the Asian Regional Project on Radiation

[D.5] INFCIRC/167.

Preservation of Fish and Fishery Products. Pilot-plant-scale feasibility studies (mainly on fishery products, grain, fruits and vegetables) are planned within the framework of an agreement between FAO, the Agency and the Netherlands Government, to be carried out at Wageningen with a view to establishing and operating an International Facility for Food Irradiation Technology, and attention will be given to training operators of food irradiation facilities. Regional advisory group meetings will be held annually for participants in the Asian Regional Project on Radiation Preservation of Fish and Fishery Products to evaluate the results achieved in the collaborating institutions during the preceding year, as well as to elaborate detailed working plans and determine the division of labour for the year to follow. An advisory group meeting is planned for 1975 to consider the technological and economic feasibility of low-dose irradiation of agricultural products. A training course in food irradiation will be held in 1975 or 1976.

Related activities

D.133. Research contracts and agreements will be awarded to institutions involved in technological and economic studies of food irradiation. Support services will be provided for technical assistance projects.

Plans for 1977-80

D.134. It is planned to continue and extend the activities referred to above, and a symposium, advisory group meeting and training courses may be necessary for this purpose. Emphasis will be placed on larger-scale pilot plant experiments and commercialization studies.

Co-operation with other organizations

D.135. The component involves co-operation with the Commission of the European Communities and CMEA.

Public health acceptance and legal aspects of the process of food irradiation

Objective

D.136. The objective is to facilitate the general acceptance of the process of food irradiation as a means of reducing world food losses by participating in IFIP, a joint project co-sponsored by OECD (NEA) in which 22 Member States of the Agency are at present taking part.

Results to date

D.137. Large-scale, long-term wholesomeness experiments performed under IFIP and elsewhere have failed to demonstrate any harmful effects of irradiated food.

Plans for 1975-76

D.138. It is planned to participate in the work of IFIP, which aims at producing data on wholesomeness of irradiated food and facilitating public health acceptance at the national and international level; attention will be paid to elimination of harmful organisms (micro-organisms, parasites) from food. It is proposed to convene an IAEA/FAO/WHO experts' meeting on the results of the data produced by IFIP in 1975 or 1976. A research co-ordination meeting on elimination of harmful organisms will be held in 1975. Joint activities with the Legal Division of the Agency will assist Member States in formulating their legal regulations on food irradiation.

Related activities

D.139. Research on the elimination of harmful organisms from food by irradiation will be sponsored. Support services will be provided for technical assistance projects.

Plans for 1977-80

D.140. The activities started in 1975-76 will be continued and, it is hoped, completed. Attention will then be given to additional food products.

Co-operation with other organizations

D.141. This component involves co-operation with WHO, OECD (NEA) and the Codex Alimentarius Commission.

CONTRIBUTION OF THE FAO TOWARDS THE PROGRAMME

D.142. For 1975 the staff provided by FAO to the Joint Division will consist of the Director and five Professional officers. Funds for GS posts are provided under contractual services. For 1976 it is expected that FAO will increase its staff by one Professional officer at the P-4 level and provide funds to meet the cost of one additional GS staff member.

D.143. The budget of FAO is prepared on a biennial basis, covering different years from those of the Agency, and consequently only the estimates for the two-year period 1974-1975 are available; these estimates amount to $685 540, as shown in Table D.3 above.

E. LIFE SCIENCES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table E.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	250 989	331 000	30 000	(18 100)	11 900	342 900	400 000
Consultants	9 932	19 000	1 200	(3 000)	(1 800)	17 200	21 000
Overtime	-	300	-	-	-	300	-
Temporary assistance	52	-	-	-	-	-	-
Sub-total	260 973	350 300	31 200	(21 100)	10 100	360 400	421 000
Common staff costs	81 982	106 400	10 700	(5 900)	4 800	111 200	129 000
Travel	11 056	18 000	1 000	(2 000)	(1 000)	17 000	21 000
Meetings							
Conferences, symposia, seminars	27 681	39 000	3 000	(2 000)	1 000	40 000	58 000
Technical committees, advisory groups	31 813	50 000	3 000	(16 000)	(13 000)	37 000	60 000
Representation and hospitality	1 225	3 300	100	-	100	3 400	4 000
Scientific and technical contracts	268 374	317 000	16 000	-	16 000	333 000	350 000
Common services, supplies and equipment	332	-	-	-	-	-	-
Other items of expenditure							
Linguistic services	22 496	24 000	3 000	-	3 000	27 000	30 000
Printing and publishing services	157 711	155 000	13 000	(10 000)	3 000	158 000	170 000
TOTAL	863 643	1 063 000	81 000 7.6%	(57 000) (5.4%)	24 000 2.2%	1 087 000	1 243 000
Data processing services	9 586	16 000	1 000	-	1 000	17 000	20 000

SUMMARY OF MANPOWER

Table E.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	4	4	4	-	4	4
P-4	6	6	6	-	6	6
P-3	1	1	1	-	1	1
P-2	1	1	1	-	1	1
P-1	1	1	1	-	1	1
Sub-total	14	14	14	-	14	14
GS	10	10	10	-	10	10
M&O	-	-	-	-	-	-
TOTAL	24	24	24	-	24	24

CHANGES IN COSTS

E. 1. As will be seen from Table E. 1 above, the total cost of this programme is expected to increase by $24 000 as a net result of price increases of $81 000 partly offset by a programme reduction of $57 000. The programme reduction was achieved mainly by further delaying recruitment in respect of two vacant posts at the P-1 and P-2 level, respectively, in the Radiation Biology sub-programme, which is expected to result in savings of $24 000, and by a reduction of $18 000 in the programme of meetings. The balance of $15 000 relates to consultants services, travel and printing and publishing services.

THE PROGRAMME

OBJECTIVE

E. 2. The objective is to foster the development of methods and techniques for the application of radioisotopes in medicine and biology, special emphasis being placed on meeting the needs of developing countries. This programme has been the subject of consultation with WHO and will be periodically reviewed under the arrangements for joint consultation between the Agency and WHO. It is the continuing policy of the Agency to hand over to WHO at the appropriate time those activities in the programme which relate to procedures whose application has become routine.

RESULTS TO DATE

E. 3. This programme was initiated in 1958. The results to date are described in the relevant paragraphs relating to the sub-programmes and components which are set out below.

E. 4. The sub-programmes of the Division have been assessed and reorganized. There are now fewer components and, consequently, more work is being done on fewer topics. In order to make way for higher priority work, several components have been phased out or are scheduled for phase-out in the next two years, as explained in the descriptions of the sub-programmes.

PLANS FOR 1975-80

E. 5. Many new developments are emerging in nuclear medicine. On the one hand, there are in vitro radioassay procedures for measuring chemical constituents, drugs, and antigens, and on the other hand in vivo procedures for measuring body functions and for organ and cancer imaging after radiopharmaceuticals have been administered. A major part of the work will be to make the benefits of these advances accessible to Member States, especially developing countries. Attention will be given to the training of professional and other personnel in nuclear medicine.

E. 6. Efforts will be made to find ways of making use of research reactors in biomedical investigations, where activation analysis can be a powerful tool. It is planned to do work on trace elements and their possible role in neoplastic and metabolic diseases, and also to assay environmental pollution from industrial wastes and pesticides.

E. 7. Efforts will be continued to improve the quality of radiation therapy by making advances in subjects such as dosimetry and radiation biology.

E. 8. The Division's work in environmental studies will consist of the collection of data and the fostering of a better understanding of the effects of low-level radiation from man-made sources, especially power reactors.

E. 9. In vitro radioisotopic procedures will be used both for clinical studies and for research on the underlying biological processes of major health disorders.

CO-OPERATION WITH OTHER ORGANIZATIONS

E.10. This programme involves co-operation with WHO, IARC, ICRU, ICSH, BIPM, UNESCO, FAO and UNEP. For meetings of mutual interest, WHO contributes experts, discussion leaders, scientific secretaries and meets the costs of participants. So far as the co-ordinated research programme is concerned, WHO participates by awarding contracts to some of the institutions involved.

STRUCTURE

E.11. This programme consists of three sub-programmes which are dealt with separately below.

Summary of manpower and costs

Table E.3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Medical Applications	3.4	3.4	419 800	3.4	3.4	477 600
Dosimetry for Intentional Radiation Applications	4.3	4.3	257 300	4.3	4.3	252 400
Radiation Biology	6.3	2.3	409 900	6.3	2.3	513 000
TOTAL	14.0	10.0	1 087 000	14.0	10.0	1 243 000

SUB-PROGRAMMES

Medical applications

OBJECTIVE

E.12. The objective is to provide advice and assistance to Member States, particularly developing countries, in the application of radioisotopes in preventive and clinical medicine as well as in medical research.

RESULTS TO DATE

E.13. Support has been given through research contracts and agreements to projects relating to activation analysis techniques, in vitro assay techniques involving the use of radioactive tracers, scintigraphic techniques and whole-body counting techniques and their various applications, the development of improved radiopharmaceuticals, the use of radioactive tracers in dynamic function studies, the study of the role of trace elements in the etiology of various diseases, the study of immunological aspects of communicable diseases and the study of certain parasitic diseases. In a number of these fields co-ordinated research programmes have been set up jointly by the Agency and WHO.

E.14. Work carried out in the Laboratory has resulted in improved instruments and techniques for medical applications of radioisotopes, for example through the design of simple whole-body counters and the development of better criteria for the evaluation of collimators used in scintigraphy.

E.15. Recent advances in medical applications of radioisotopes have been surveyed at a number of symposia and other meetings, and a number of panels of experts has been convened to advise on specific questions. Advice and assistance relating to such applications have been given to many institutes in developing countries through technical assistance and training projects. A series of seminars has been held in collaboration with WHO to discuss the training requirements of various categories of staff of medical radioisotope units.

E.16. Support has been given to IARC in a project involving the use of activation analysis techniques in studies of the role of arsenic in certain kinds of experimental carcinogenesis, and to ICSH in the elaboration of recommended techniques for diagnostic applications of radioisotopes in haematology. The Computer Section has collaborated in a project on the intercomparison of computer-assisted scintigraphic techniques and the Industrial Applications and Chemistry Section in various projects on the production and quality of radiopharmaceuticals.

PLANS FOR 1975-76

E.17. The sub-programme of the Medical Applications Section will see several shifts in emphasis. The work on iron nutrition, dealing earlier with defects of absorption, has been phased out. In activation analysis emphasis will be placed on questions concerning ischaemic heart disease and nutrition. The Section will continue to support work on in vitro radioassay techniques in developing countries since this powerful tool is rapidly revolutionizing clinical biochemistry and offers a new potential in diagnosis and study of communicable diseases as well as cancer. Similarly, clinical in vivo radioisotope procedures are bringing new dimensions to the diagnosis of disease and study of organ function; many of these projects have particular application in developing Member States. The increasing need for training in nuclear medicine is recognized and the Section's activities in this field will be enhanced, in close co-operation with WHO and other organizations. One advisory group will be convened in 1975, and it is proposed to hold a symposium and to convene two advisory groups in 1976.

RELATED ACTIVITIES

E.18. Approximately 50 research contracts and 25 research agreements will be in force at the beginning of 1975, mostly relating to five co-ordinated research programmes. Requests for technical assistance experts, equipment and fellowships are expected to continue at the present level. A co-ordinated research programme on radiopharmaceuticals is expected to continue to be carried out jointly with the Chemistry Section. It is planned to convene two advisory groups in 1975 and to hold one symposium and convene two further advisory groups in 1976. One training course is also planned for 1976.

PLANS FOR 1977-80

E.19. Work involving nuclear techniques on outstanding nutrition problems defined by an advisory group convened in 1970 for this purpose will be initiated; the activation analysis work will in part also include aspects of nutrition. Significant demands for the provision of assistance and the support of research in topics related to the use of nuclear techniques in work on cancer, communicable diseases and endocrinology are foreseen.

CO-OPERATION WITH OTHER ORGANIZATIONS

E.20. This sub-programme involves collaboration with WHO in co-ordinated research programmes and other activities, IARC through the elaboration of techniques and the provision of services, and ICSH in the drafting of recommendations.

STRUCTURE

E.21. This sub-programme consists of four components which are described in the following paragraphs.

Medical applications

Summary by programme components

Table E.4

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Applications in nutrition studies	0.4[a/]	0.4	16 700	-	30 300	1 000	48 000
Applications of activation analysis	0.4[a/]	0.7	18 900	-	24 000	1 000	43 900
Applications of in vitro assay techniques	1.3	1.5	54 400	9 000	116 000	2 200	181 600
In vivo clinical procedures with radicactive agents	1.3	0.8	48 300	-	24 000	2 000	74 300
Linguistic, printing and publishing services	-	-	-	-	-	72 000	72 000
TOTAL	3.4	3.4	138 300	9 000	194 300	78 200	419 800

a/ In addition, half a professional man-year each by laboratory staff.

Applications in nutrition studies

Objective

E.22. The objective is to use radioactive tracer techniques to study the availability and utilization of nutrients and hence to improve nutrition, especially where it is deficient.

Results to date

E.23. This component was established in 1969 with the initiation of a joint IAEA/WHO co-ordinated research programme on iron nutrition. Simple whole-body counters have been designed in the Laboratory and five such instruments have been built and provided on request to institutes in developing countries participating in the programme. Plans for such instruments have been provided to other institutes on request. Techniques for the measurement of radioisotopes of iron in blood have been tested in the Laboratory and intercomparisons of such measurements made in participating institutes have been organized. Food-stuffs labelled with radioisotopes of iron have been distributed to participating institutes. Techniques for the study of iron absorption have been employed under various dietary regimes. The results obtained have contributed significantly to the understanding of iron nutrition under a number of dietary regimes now prevailing, and the study of these naturally occurring conditions will be phased out. A panel of experts was convened in 1973 to advise on general aspects of the use of radioactive tracer techniques for the study of gastrointestinal absorption, and its report was published.

Plans for 1975-76

E.24. In accordance with the recommendations of the panel mentioned above, another co-ordinated research programme may be set up to study the availability and utilization of other nutrients, such as lipids or proteins. It is planned to convene in 1976 a further advisory group on applications of nuclear techniques in gastrointestinal absorption studies and other outstanding problems in these areas.

Plans for 1977-80

E.25. Work on a new nutrition project with emphasis on new techniques will be carried out in accordance with recommendations of the advisory group and requests from Member States.

Applications of activation analysis

Objective

E.26. The main objective is to use activation analysis techniques to study the role of certain trace elements in the etiology of various diseases. A secondary objective is to employ the research potential of reactors, particularly in developing countries, in the study of problems of local significance.

Results to date

E.27. This component was established in 1965. A co-ordinated research programme on the medical applications of activation analysis was initiated in 1969. This had as its main component a joint IAEA/WHO research programme on trace elements in cardiovascular diseases which aimed at studying the possible association of specific elements in the food chain and in human tissues with the incidence of cardiovascular diseases in different Member States. Relevant analytical techniques have been elaborated and tested in the Laboratory, tissue and food specimens have been analysed by participating institutes and intercomparisons of such analyses have been made. Preliminary results, which have been published, suggest that there are interesting associations between trace elements and cardiovascular diseases, but do not permit conclusions to be drawn.

E.28. Other projects have yielded preliminary results regarding trace elements in relation to cystic fibrosis, goitre and malnutrition. Support has been given to IARC in a project involving the use of activation analysis techniques in studies of the role of arsenic in certain types of experimental carcinogenesis. An expert panel was held in 1968 and two symposia on the subject have been held, in 1967 and 1972 respectively.

Plans for 1975-76

E.29. It is expected that the existing co-ordinated research programme on the medical applications of activation analysis will have been reconstituted by early 1975 as one or more new programmes dealing with specific aspects of trace element metabolism, notably in the fields of ischaemic heart disease and nutrition. Primary emphasis will continue to be placed on these programmes through 1976 and an increase both in scope and in the number of participating institutes is expected. Secondary emphasis will be given to quality control in medical activation analysis. Work relating to other types of disease will continue.

Plans for 1977-80

E.30. The project on trace elements in ischaemic heart disease will be phased out. Work on projects relating to other types of disease, such as malnutrition, cancer and dental caries, could then be intensified.

Application of in vitro assay techniques

Objective

E. 31. The objective is to use in vitro assay techniques employing radioactive tracers, such as radioimmunoassay, firstly in the study of immunological aspects of communicable diseases, and secondly in the measurement of hormones, vitamins and other substances in clinical medicine and research. In vitro radioisotope labelling and assays for measuring clinical and microbiological constituents have complicated technical aspects which require the advice of and assistance from an international organization. For this reason, this component has special importance for developing countries.

Results to date

E. 32. This component was initiated in 1969. A joint IAEA/WHO co-ordinated research programme on the use of labelled antigens in serological epidemiology was initiated in 1970. Relevant techniques for the study of immunological aspects of diseases such as cholera, plague and smallpox have been elaborated and are now being applied in epidemiological studies of the immunological status of populations at risk from such diseases. A panel of experts was convened in 1971 to advise on general aspects of the use of radioactive tracers in microbial immunology, and their report was published.

E. 33. A co-ordinated research programme on in vitro assay techniques, aimed at promoting the more widespread use of techniques such as radioimmunoassay in clinical medicine and research, was set up in 1971. Intercomparisons of radioimmunoassay measurements in participating institutions have been organized. A panel of experts was convened in 1972 to advise on the standardization of radioimmunoassay procedures, and their report was published. Two symposia dealing with in vitro assay procedures were held, in 1969 and 1973 respectively, and their proceedings were published. A number of technical assistance and training projects have been implemented. Regional training courses on radioimmunoassay techniques were held in 1971 and 1974.

Plans for 1975-76

E. 34. Work on immunological aspects of communicable diseases will continue but with a lesser emphasis on applications in epidemiological studies and a greater emphasis on applications in clinical diagnosis and investigation, for example in the identification of fevers of unknown origin. It is planned to convene a further advisory group in 1976 to advise on such applications, for example applications of radioactive tracers in microbial immunology. The co-ordinated research programme on in vitro assay will have a greater emphasis on techniques for the measurement of hormones involved in human reproduction, hormones of small molecular size, and tumour- and virus-associated antigens. An advisory group will be convened in 1975 to advise on "receptor" assay techniques. A continuing demand for technical assistance and training is expected. A further regional training course on radioimmunoassay techniques is planned for 1976. Co-operative efforts will be undertaken with the Joint IAEA/FAO Division to make technical advances in these areas available to those working in veterinary science and animal husbandry.

Plans for 1977-80

E. 35. Continuing demands for the support of research activities and for technical assistance and training are foreseen. A further symposium dealing with in vitro assay procedures is planned for 1977. Reviews will be made to assess the means by which, and appropriate date at which, these radioisotope techniques can be transferred to other appropriate United Nations or national health organizations.

In vivo clinical procedures with radioactive agents

Objective

E. 36. The objective is to use radioactive agents in localizing neoplasms, visualizing organs and detecting impaired bodily functions in clinical medicine. The emphasis is to be placed on the development and standardization of new techniques and on training.

Results to date

E. 37. This is a new component arising out of previous work in two separate fields - scintigraphic imaging procedures and functional studies with radionuclides. In earlier years attention was given to the improvement of collimators for scintigraphy, to the intercomparison of techniques for the processing of scintigraphic data and to the standardization of techniques for various types of functional studies, such as thyroid radionuclide uptake studies. Support has been given to ICSH in the elaboration of recommended techniques for diagnostic applications of radionuclides in haematology. A number of symposia and other meetings has been organized to exchange information on new advances in both scintigraphy and functional studies, and the resulting publications have had wide use as reference sources and training manuals. Many technical assistance projects in these fields have been implemented. A series of seminars has been held in collaboration with WHO to discuss the training requirements of various categories of staff concerned in such work. It is of interest to note that two important developments are to be expected. First, the increasing use of on-line computers will lead to more reliable and automatized use of scintigraphic procedures. Although the Agency is not directly responsible for the development of computer techniques, the latter will be adequately covered in training programmes. The second development will be the application of new labelled agents for improved and more specific localization of neoplasms and organs. Progress in this direction might also be achieved by introducing semiconductor detectors into imaging. Special attention will be given to the contributions of nuclear methods to cancer diagnosis.

Plans for 1975-76

E. 38. The co-ordinated research programme on the intercomparison of techniques for computer-assisted scintigraphy will be phased out in 1975. Another such programme aimed at the development of new techniques and new radioactive agents for functional studies based on quantitative imaging procedures will be initiated. It is proposed to hold a symposium dealing with new imaging and related procedures in medicine in 1976. A continuing demand for technical assistance and training is expected.

Plans for 1977-80

E. 39. Work will continue on imaging procedures and in vivo use of radioactive agents. Training courses on in vivo radioisotopic procedures are envisaged. The convening of one or more further advisory groups to consider the standardization of techniques for functional studies based on imaging procedures is planned. A symposium dealing with innovations in the in vivo use of radioactive agents is planned for 1978.

Dosimetry for intentional radiation applications

OBJECTIVE

E. 40. The objective is to advise and assist Member States in relation to dosimetric problems and procedures for intentional radiation applications. These activities cover the calibration, standardization and intercomparison of dosimetric equipment used in

medicine, biology, industry and agriculture, and the compilation and dissemination of physical data required in these fields. In the Dosimetry Section special efforts will be made to transfer appropriate components of the programme to WHO as soon as the application of the methods in question has assumed a routine character.

RESULTS TO DATE

E.41. The various projects have resulted in improvement of dosimetry, particularly in radiotherapy. Through the activities of the Dosimetry Section the need for accurate dosimetry in all fields of radiation application has been recognized by many authorities and this has led to the support of relevant projects in Member States.

E.42. An enquiry among Member States indicated insufficient interest to justify continuation of the component consisting of dosimetry for large industrial and food processing radiation sources. This component has been phased out. A Dosimetry Manual for Food Irradiation Processing was completed and published in the IAEA Technical Reports Series.

E.43. Part of the component dealing with physical data for radiation dosimetry, radiation biology and radiation therapy has been phased out. The remaining items will be continued under a component entitled "Computer systems in dosimetry".

PLANS FOR 1975-76

E.44. The sub-programme on dosimetry is focused on four main subjects, chosen to meet the needs indicated by Member States. The postal dose intercomparison programme is designed to increase the accuracy of dosimetry used for radiation therapy. Closely related is the Secondary Standards Dosimetry Laboratories project whereby regional laboratories eventually can take over the work of the postal dose intercomparisons. The work on computer systems in dosimetry involves modern computerized planning to facilitate the execution of radiotherapy programmes, especially in developing countries. The fourth subject dealt with is neutron dosimetry. In 1975 it is planned to convene an educational seminar on the utilization of californium-252 in university training in connection with the californium-252 loan programme, an advisory group on absolute dose measurement and a symposium on biomedical dosimetry. An advisory group on intercomparison and standardization in dosimetry is planned for 1976.

RELATED ACTIVITIES

E.45. Approximately 15 research contracts, 3 technical contracts and 20 research agreements will be in force by the end of 1975, most of them relating to three co-ordinated research programmes. Two interregional training courses on dosimetry in medical radiation applications are planned for 1975-76. The Section will continue to provide services and advice in technical assistance dosimetry projects involving experts and fellowships.

PLANS FOR 1977-80

E.46. The main activities under this sub-programme aimed at improving the accuracy of dosimetry in the life sciences will be continued. The postal dose intercomparison service will be gradually decreased, serving only those areas not yet covered by regional or local Secondary Standards Dosimetry Laboratories. The work on neutron dosimetry will be continued; it will be modified as necessary to meet the needs of Member States.

CO-OPERATION WITH OTHER ORGANIZATIONS

E.47. The programme of the Dosimetry Section involves co-operation with WHO in two components, and with ICRU and BIPM in one component each.

STRUCTURE

E.48. This sub-programme consists of four components which are described in the following paragraphs.

Dosimetry for intentional radiation applications

Summary by programme components

Table E.5

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Postal dose inter-comparison service	1.2	1.6	47 600	6 000	10 000	1 400	65 000
Secondary standards dosimetry laboratories	1.1	1.1	41 500	-	10 000	2 300	53 800
Computer systems in dosimetry	1.0	0.5	32 800	-	5 000	1 100	38 900
Neutron dosimetry for radio-biological and medical applications	1.0	1.1	37 600	20 000	7 700	2 300	67 600
Linguistic, printing and publishing services	-	-	-	-	-	32 000	32 000
TOTAL	4.3	4.3	159 500	26 000	32 700	39 100	257 300

Postal dose intercomparison service

Objective

E.49. The objective is to check and improve the accuracy of dosimetry in radiotherapy centres and thereby increase the effectiveness of radiation treatment of patients.

Results to date

E.50. About 800 intercomparisons including 400 institutes from 60 Member States have been carried out over a period of five years. All institutes with inaccurate dosimetry showed considerable improvement in their results when checked in a second intercomparison. A pilot study on the feasibility of some thermoluminescence dosimetry systems for X-ray intercomparisons has been conducted.

Plans for 1975-76

E.51. The work under this component will relate to the following subjects:

(a) Cobalt-60 dose intercomparison. This work was initiated in 1968. It is expected that a considerable part of the dose intercomparisons will be carried out by regional or local Secondary Standards Dosimetry Laboratories (see paragraphs E.55-60 below);

(b) X-ray exposure intercomparison. This work was initiated in 1973. It is expected that about 150-200 institutes per year, most of them in developing countries, will benefit from this work; and

(c) High energy electrons and photons. The work on this subject will, by special request, be continued on a modest scale, and chemical dosimeters will be used. The Agency's absorbed dose calorimeter will also be used. An advisory group on new techniques in absolute absorbed dose measurement will be convened in 1975.

Related activities

E.52. The related activities involve a number of research contracts on the development of new dosimetry techniques and the calibration, intercomparison and standardization of selected types of dosimeters. A training course on dosimetry in radiotherapy is envisaged.

Plans for 1977-80

E.53. It is expected that a considerable part of the cobalt-60 intercomparison work will have been taken over by the Secondary Standards Dosimetry Laboratories, and that the X-ray intercomparison will therefore constitute the main part of the component.

Co-operation with other organizations

E.54. The intercomparison service for radiotherapy centres involves co-operation with and financial support from WHO.

Secondary Standards Dosimetry Laboratories

Objective

E.55. The objective is to initiate and assist in the setting up of regional or local Secondary Standards Dosimetry Laboratories in Member States of the Agency. The absence of adequate dosimetry calibration facilities in most of their Member States has led the Agency and WHO to recommend the establishment of such laboratories. They may be designed to meet regional demands or may be local institutions in the case of countries with large local needs. In either case it is very desirable to operate such laboratories in such a way as to ensure co-ordination of their efforts and international co-operation with each other and with recognized primary standards laboratories.

Results to date

E.56. Six Secondary Standards Dosimetry Laboratories were established by WHO with the co-operation of the Agency between 1969 and 1973 and the Dosimetry Section has provided technical advice, experts and guidance for their activities.

Plans for 1975-76

E.57. It is envisaged that the setting up of two further laboratories will be initiated by WHO. The role of the Agency will be the same as in the case of the other six laboratories. In particular, it is planned that these laboratories should eventually take over the cobalt-60 postal dose intercomparison services for their regions, which are at present performed by the Agency's Dosimetry Section. An advisory group meeting on intercomparison and standardization procedures in dosimetry is planned to be held in 1976.

Related activities

E. 58. This component is closely related to the Joint IAEA/WHO Radiotherapy Postal Dose Intercomparison. The laboratories will co-operate closely with the Dosimetry Section and recognized primary standards laboratories.

Plans for 1977-80

E. 59. Continuation of the work on the same scale is envisaged.

Co-operation with other organizations

E. 60. This component involves co-operation with WHO, BIPM and with some national standards laboratories.

Computer systems in dosimetry

Objective

E. 61. The objective is to facilitate and improve the assessment of dose distributions in treatment planning by using advanced computer systems and to provide, in co-operation with advanced institutions, suitable computerized treatment planning systems to radiotherapy clinics. This service, although routine in some advanced countries, is not provided and is badly needed in developing countries. The work includes the collection, review and publication of physical data relating to the interaction processes between radiation and matter, with emphasis on radiation applications in biology and medicine. Dissemination of isodose distributions is an important part of this component.

Results to date

E. 62. As a result of a co-ordinated research programme, comprehensive computer programmes have been carried out in co-operation with institutions in various countries. The response to questionnaires has shown that there is a demand for computerized treatment planning in many developing radiotherapy centres; this was reported to an Agency panel on dose computation and computerized treatment planning which made recommendations on future activities. The preparatory work for the publication of Volume V of the Atlas of Radiation Dose Distributions and the third edition of the Directory of High Energy Radiotherapy Centres has been completed. Requests for radiation dosimetry data are being received and processed at the rate of about 30 per year and the demand for the service is increasing.

Plans for 1975-76

E. 63. The Agency will continue to provide radiotherapy clinics in Member States with the necessary computer-calculated isodose charts and with suitable computer programmes. Consideration will be given to the establishment of a pilot regional computer network for computerized treatment planning services. Two international training courses on dosimetry in medical applications are planned. A manual on the use of computers in treatment planning will be published and a directory of various computerized treatment planning systems will be compiled. Updating and reorganization of the Agency's radiation dosimetry data collection is planned. Discussions initiated in 1974 with WHO on the feasibility of transferring this activity to WHO or another appropriate United Nations organization will continue during this period.

Related activities

E. 64. It is expected that three research contracts and a number of research agreements will be concluded. Services will be provided for technical assistance projects.

Plans for 1977-80

E. 65. The work will be continued only to the extent required to meet the needs of Member States. If the demand should arise, a new directory of high energy radiation therapy centres will be prepared.

Co-operation with other organizations

E. 66. Apart from co-operation with WHO, parts of this component involve the exchange of information and co-operation with ICRU.

Neutron dosimetry for radiobiological and medical applications

Objective

E. 67. The objective is to improve and standardize dosimetry methods for fast neutrons and mixed neutron-gamma fields used in radiation therapy and radiobiological studies, and to provide universities and research institutes with californium-252 sources on a loan basis.

Results to date

E. 68. Following recommendations of an Agency panel on "Fast Neutron Dosimetry: Characterization, Standardization and Intercomparison", a co-ordinated research programme has been initiated, aimed at the development of a portable intercomparison instrument, which will be used by the co-operating institutes for a pilot fast neutron dose intercomparison. Based on the donation of californium-252 needles by the USAEC, a loan programme for centres using such sources for training purposes has been started.

Plans for 1975-76

E. 69. The californium-252 loan programme will be continued and a laboratory syllabus will be published. Co-operation with national standards laboratories and international commissions in regard to the organization of a fast neutron dose intercomparison programme will be continued. An educational seminar on the utilization and dosimetry of californium-252 in university training and biomedical research is planned for 1975, which is expected to be attended by 50 participants from universities and other educational establishments. A symposium on advances in biomedical dosimetry, including the subject of dosimetry of mixed neutron gamma fields, is also planned for 1975. It is expected that the work on californium-252 sources will be completed by the end of 1975.

Related activities

E. 70. A number of research agreements will be in operation.

Plans for 1977-80

E. 71. Further activities will be determined by the requests of Member States.

Radiation biology

OBJECTIVE

E. 72. The objective is to advise and assist Member States of the Agency, in particular the developing countries, in accumulating and evaluating information on both somatic and genetic effects of ionizing radiation in order to promote application of these biological effects for practical purposes in medicine and public health as well as certain areas of agriculture and industry, and to protect man and his environment from the potential harm due to ionizing radiation associated with the use of nuclear energy, and to organize co-ordinated research activities to this end.

RESULTS TO DATE

E.73. Information about fundamental mechanisms of radiation damage and repair processes in biological systems and various applications of radiobiological effects for beneficial purposes has been exchanged and made available to Member States through the organization of scientific meetings, including four symposia, ten panel and working group meetings, and three research co-ordination meetings. Training of technical personnel from the developing Member States has been promoted through fellowship awards, training courses, and technical advisory missions undertaken by the staff. Information has been disseminated by the publication of manuals in addition to the symposia and panel proceedings. A recommended "Code of Practice for Radiosterilization of Medical Products" has been formulated and published. The programme components on radiation-induced cancer and on chromosomal aberrations as biological monitors of radiation exposure have been transferred to WHO. The component on radiation biology of neutrons and heavy particles as well as the work on radiation attenuation of toxins and animal poisons have been phased out.

PLANS FOR 1975-76

E.74. The radiation biology sub-programme continues to aim at the establishment of a sound scientific basis for the practical applications of radiobiological effects such as radiation sterilization of medical products and biological preparations, radiogenetic improvement of industrial micro-organisms, radiation attenuation of parasites and other infective agents for preparation of vaccines, enhancement of the efficiency of radiation therapy, protection of the environment against pollutants of biological origin and improvement of biosphere resources. Increasing emphasis will be placed on radiobiological studies needed to evaluate hazards to man and his environment from ionizing radiation associated with the use of nuclear energy.

E.75. The work on the protection of the environment against pollutants of biological origin is complementary to the environmental protection work of the Division of Nuclear Safety and Environmental Protection, the Division of Research and Laboratories, and the Joint FAO/IAEA Division. Two advisory groups and one symposium are planned for 1975, and it is proposed to convene two advisory groups and one symposium, as well as a seminar (jointly with the Joint FAO/IAEA Division), in 1976.

PLANS FOR 1977-80

E.76. The emphasis in the Agency's work on radiation sterilization will be shifted from disposable medical products to medicaments, pharmaceutical starting materials and biological preparations. The scope of the work relating to radiation attenuation of parasitic organisms will be broadened to include helminths and possibly other types of infective agents. The work on chemical modification of radiosensitivity will include the sensitization of malignant cells and the protection of normal tissue cells. The environmental radiation biology component will be focused on the protection of man and his environment.

CO-OPERATION WITH OTHER ORGANIZATIONS

E.77. This sub-programme involves co-operation with UNESCO, WHO, FAO and IAMS in the organization of joint scientific meetings and consultations, co-ordinated research programmes, seminars and training courses.

STRUCTURE

E.78. This sub-programme consists of five components which are described in the following paragraphs.

Radiation biology

Summary by programme components

Table E. 6

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Radiation sterilization of medical products and biological tissues	1.0	0.4	30 800	-	20 000	1 000	51 800
Radiation genetics applied for improvement of industrial microorganisms	1.0	0.4	28 700	11 000	25 000	1 300	66 000
Radiation attenuation of infective agents for the preparation of vaccines and diagnostic antigens	1.1	0.5	34 700	-	30 000	1 300	66 000
Modification of radiosensitivity	1.1	0.5	33 800	11 000	15 000	1 400	61 200
Environmental radiation biology	2.1	0.5	45 800	20 000	16 000	2 100	83 900
Linguistic, printing and publishing services	-	-	-	-	-	81 000	81 000
TOTAL	6.3	2.3	173 800	42 000	106 000	88 100	409 900

Radiation sterilization of medical products and biological tissues

Objective

E. 79. The objective is to promote practical applications of the microbicidal effect of radiation for sterilization of medical products, pharmaceuticals and biological tissues.

Results to date

E. 80. The Agency's activity in relation to radiation sterilization of medical products was initiated in 1967. Since then, relevant research has been supported and co-ordinated. A recommended code of practice for radiosterilization of medical products has been elaborated and published, and substantial parts of this document have been used by many Member States in their national regulations governing sterilization procedures and control of sterility. An over-all revision and updating of the code has been started. Biological monitoring systems consisting of suitable radioresistant vegetative and spore-forming bacteria have been developed and made available for calibration of new facilities and standardization of radiation sterilization processes. Progress made in the subject was reviewed at symposia held in 1967 and 1974, and the respective proceedings were published. The accumulated information has resulted in the publication of a Manual on Radiation Sterilization of Medical and Biological Materials. A regional training course for Member States in Latin America and an interregional training course contributed to the dissemination of information.

Plans for 1975-76

E. 81. Research on radiation sterilization will be continued. Emphasis will be placed on projects designed to study the applicability of this method to new types of medical products and pharmaceuticals, the radioresistance of micro-organisms surviving exposure

to substerilizing radiation doses, and the antigenic alterations induced by radiation in bio-products and tissue derivatives. An advisory group will be convened in 1976 on this latter subject. The revised version of the recommended code of practice will be completed and made available to Member States.

Related activities

E. 82. The related activities involve research contracts and agreements as well as advisory missions to developing Member States. An interregional training course on the use of radiation for sterilization of medical products is proposed for 1975 for the countries of the Mediterranean region, Eastern Europe, the Middle East and North Africa.

Plans for 1977-80

E. 83. Member States will continue to be assisted with the standardization and calibration of radiation sources, regulations of radiation sterilization practices, through the accumulation and dissemination of relevant information and regular updating of the code of practice in the light of new information.

Co-operation with other organizations

E. 84. Close co-operation is maintained with WHO in the development and standardization of radiation sterilization practices.

Radiation genetics applied for improvement of industrial micro-organisms

Objective

E. 85. The objective is to utilize radiation and radioactive isotopes to develop and characterize mutants of industrial micro-organisms having improved biosynthetic properties. The Agency's role is focused on the radiation aspects of creating improved strains.

Results to date

E. 86. This component, formerly entitled "Radiation microbiology", was initiated in 1970. Since then, research contracts and agreements on relevant topics have been supported and co-ordinated in both developing and developed Member States. Encouraging results have been obtained with radiation-induced mutant micro-organisms possessing an increased yield of nutrient protein and organic acids from agricultural by-products. A symposium on radiation and radioisotopes for industrial micro-organisms was held in 1972 and the proceedings published. A regional training course for Member States in the Far East was held in 1972.

Plans for 1975-76

E. 87. Research on the radiation induction and selection of mutants in industrial micro-organisms capable of producing nutrient protein from local agricultural and domestic wastes will continue to receive support. An advisory group on radiation genetics for the improvement of industrial micro-organisms will be convened in 1975. A manual on the use of nuclear techniques in applied microbiology will be prepared in collaboration with UNESCO, with which close co-operation is expected to increase.

Related activities

E. 88. The related activities involve 12-15 research contracts and agreements on the use of radiation-induced mutants of industrial micro-organisms to produce nutrient protein, essential amino acids and organic acids. Training of microbiologists and biochemists from developing Member States on uses of nuclear techniques in applied microbiology will be carried out through an organized course and fellowship awards.

Plans for 1977-80

E. 89. The emphasis in the work will be shifted to improved nuclear methods for selected mutant micro-organisms producing nutrient protein and enzymes; the scope of the work will be defined by the need for nuclear techniques in this field. It is planned to hold a regional training course for the Latin American countries.

Co-operation with other organizations

E. 90. This component involves co-operation with UNESCO, WHO and IAMS in consultations on scientific and technical matters.

Radiation attenuation of infective agents for the preparation of vaccines and diagnostic antigens

Objective

E. 91. The objective is to elaborate the uses of nuclear techniques for the study and preparation of vaccines against human parasites and other infective agents and for the production of diagnostic antigens.

Results to date

E. 92. This component was established in 1969, with emphasis on the use of radiation for reducing the toxicity of various poisonous proteins of bacterial, plant and animal origin, including snake venoms. A panel meeting was held on the radiosensitivity of toxins and animal poisons and the proceedings were published.

E. 93. On experts' advice, the emphasis has been shifted to the use of radiation for attenuation of protozoal parasites, such as malaria, trypanosoma, and leishmania, and the preparation of vaccines against those human parasitic diseases which are particularly widespread in developing countries in tropical regions. A co-ordinated research programme has been developed, in harmony with the animal parasitology programme of the Joint FAO/IAEA Division and in close collaboration with WHO, involving 12 research contracts and agreements with both developing and developed Member States. An informal panel discussion on nuclear applications in parasitology research was organized in conjunction with the Fourth International Congress on Parasitology; a panel meeting was convened, under the co-sponsorship of the Agency and WHO, to consider the extension of these studies to some helminthic infections.

Plans for 1975-76

E. 94. The co-ordinated research programme will continue. It is expected that the scope of the work will be extended to include helminthic infections of major public health importance, such as filariasis, schistosomiasis, ascariasis and hookworm disease. It is proposed to convene an advisory group meeting in 1976 to discuss the use of radiation for the preparation of bacterial and viral vaccines and diagnostic antigens, and - also in 1976 - a seminar on the use of nuclear techniques in medical and veterinary parasitology, to be organized in collaboration with the Joint FAO/IAEA Division.

Plans for 1977-80

E. 95. The development of the work under this component will be reviewed and the activities to be carried out during this period will then be decided.

Co-operation with other organizations

E. 96. This component involves co-operation with WHO in support of research, training and the organization of scientific meetings.

Modification of radiosensitivity

Objective

E. 97. The objective is to promote the application of new radiobiological findings to radiation therapy for the improvement of its efficiency. Selective modification of radiosensitivity of tumour versus normal cells by chemicals appears to be a promising way to enhance the effectiveness of radiation therapy.

Results to date

E. 98. The work on modification of radiosensitivity is a new component based upon the recommendations of consultants and a panel of experts. It replaces the previous therapy-oriented component entitled "Radiation biology of neutrons and heavy particles", under which a symposium on the effects of neutron irradiation upon cell function was held and the proceedings published. It is of interest to note that it has become apparent that the application of neutrons for practical purposes, including therapy, has been limited, on the one hand, by the difficulties encountered in achieving accurate spectrometry and dosimetry of neutrons available from reactors and, on the other, by the high cost of mono-energetic neutron sources. Experiments on chemical modification of radiosenstivity can, however, be carried out with relatively modest facilities, and significant contributions to the subject can be made by countries other than the highly developed ones.

Plans for 1975-76

E. 99. During this period the main emphasis will be placed on chemicals that sensitize hypoxic cells within the tumour tissue, without influencing the sensitivity of well oxygenated normal tissue cells. The collection, evaluation and dissemination of information on chemical radiosensitizers that are readily available, relatively non-toxic, and of selective activity on neoplastic versus normal tissue cells will be carried out. An advisory group on modification of radiosensitivity in biological systems, with emphasis on chemical radiation protection, will be convened in 1975 or, if clinical trials of one or more radiosensitizing agents are warranted, an advisory group will be convened jointly with WHO to draw up guidelines for such clinical trials and to expedite their initiation. A symposium is planned for 1976, in collaboration with WHO, on radiobiological research necessary for the improvement of radiotherapy.

Related activities

E. 100. Research in the field of radiation sensitizers will be supported and co-ordinated. An interregional training course on basic methods and techniques in radiobiological research is proposed for participants from developing countries.

Plans for 1977-80

E. 101. It is expected that the scope of the component will be enlarged to include chemical modifiers of radiosensitivity that protect normal cells against the damaging effect of radiation.

Co-operation with other organizations

E. 102. This component involves co-operation with WHO in the organization of scientific meetings and development of co-ordinated research.

Environmental radiation biology

Objective

E. 103. The objective is, first, to utilize radiobiological effects for the protection of the environment and the improvement of biosphere resources and, secondly, to collect and

evaluate information for the assessment of hazards to man and his environment from radiation accompanying nuclear applications.

Results to date

E.104. This component was initiated in 1972. A co-ordinated research programme on the use of nuclear techniques for the improvement of biosphere resources has been developed to accumulate and disseminate relevant information, and a research co-ordination meeting has been held. A panel meeting has been convened for 1974 on the use of nuclear techniques in the management of waste of biological origin.

Plans for 1975-76

E.105. The goal of the co-ordinated research programme on environmental radiation biology will be determined on the basis of the recommendations of the panel mentioned in the preceding paragraph. A symposium will be held in 1975 on the biological effects of low-level radiation pertinent to protection of man and his environment. It is planned to co-operate with the Division of Research and Laboratories in a seminar proposed for 1975 on the use of high-level radiation for the treatment of domestic sewage, industrial waste water and water resources, and in other related activities.

Related activities

E.106. Research projects relevant to the co-ordinated programme will be supported.

Plans for 1977-80

E.107. The environmental radiation biology programme activities will be concentrated on the biological aspects of the protection of man and his environment.

Co-operation with other organizations

E.108. This component will involve co-operation and consultations on the work programme with UNEP, WHO and FAO.

F. PHYSICAL SCIENCES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table F.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	466 318	543 500	54 500	17 000	71 500	615 000	690 000
Consultants	17 791	28 000	2 200	6 000	8 200	36 200	35 000
Overtime	40	-	-	-	-	-	-
Sub-total	484 149	571 500	56 700	23 000	79 700	651 200	725 000
Common staff costs	152 316	175 100	18 500	5 500	24 000	199 100	222 200
Travel	19 787	34 800	1 900	-	1 900	36 700	39 000
Meetings							
Conferences, symposia, seminars	54 778	50 000	3 000	2 000	5 000	55 000	100 000
Technical committees, advisory groups	64 067	83 000	4 000	(13 000)	(9 000)	74 000	98 000
Representation and hospitality	3 129	4 600	400	-	400	5 000	5 800
Scientific and technical contracts	100 186	117 000	6 000	49 000	55 000	172 000	189 000
Scientific supplies and equipment	747	18 000	1 000	-	1 000	19 000	24 000
Common services, supplies and equipment	3 076	5 000	500	500	1 000	6 000	7 000
Other items of expenditure							
Linguistic services	37 451	40 000	5 000	-	5 000	45 000	50 000
Printing and publishing services	198 179	319 000	28 000	(49 000)	(21 000)	298 000	312 000
TOTAL	1 117 865	1 418 000	125 000 8.8%	18 000 1.3%	143 000 10.1%	1 561 000	1 772 000
Data processing services	59 087	71 000	4 000	5 000	9 000	80 000	90 000

SUMMARY OF MANPOWER

Table F.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	5	5	5	-	5	5
P-4	6	6	6	4	10	10
P-3	8	8	8	(3)	5	5
P-2	2	2	2	-	2	2
P-1	1	1	1	-	1	1
Sub-total	23	23	23	1	24	24
GS	16	16	16	-	16	16
M&O	-	-	-	-	-	-
TOTAL	39	39	39	1	40	40

CHANGES IN COSTS AND MANPOWER

Costs

F.1. It is expected that the cost of this programme will increase in 1975 by $143 000 of which $125 000 will be required to cover salary and other price increases and $18 000 will be a programme increase. The programme increase is mainly attributable to the cost of a new Professional post at the P-4 level amounting to $22 500 and an increase of $6000 for consultants; a decrease of $11 000 is expected for meetings. It is foreseen that the programme increase of $49 000 in respect of research contracts will be offset by a decrease for printing and publishing services.

Manpower

F.2. As will be seen from Table F.2 above, one additional post at the P-4 level is needed and it is proposed to upgrade three P-3 posts to the P-4 level. The new post is required for the Industrial Applications and Chemistry Section and the posts for which the upgradings are foreseen are in the Nuclear Data and Physics Sections.

THE PROGRAMME

OBJECTIVE

F.3. The objective is to stimulate research, to foster information and data exchange and to co-ordinate the efforts of scientists from different countries in physics, industrial applications of isotopes, chemistry, nuclear data and isotope hydrology. Special attention will be paid to the needs of developing countries in the fields mentioned above and to education and training in nuclear science and techniques.

RESULTS TO DATE

F.4. This programme was initiated in 1958 and developed in the following years; the results to date are given in the paragraphs describing the sub-programmes and their components. The programme includes problems of the physics and chemistry of fission, the application of nuclear techniques, fusion physics, the practical application of activation analysis, the various aspects of the production and utilization of isotopes, the chemistry of nuclear materials, the development of ground water resources and the world-wide exchange and dissemination of nuclear data. About 120 research contracts and agreements have been serviced since the inception of the programme, which has included eight co-ordinated research programmes. During 1973, support services were provided in relation to three training courses, about 100 fellowships and some 40 technical assistance requests.

PLANS FOR 1975-80

F.5. In order to phase out some activities and focus attention on those of greatest importance, changes have been made in sub-programmes and components.

F.6. In the "Physics" sub-programme, efforts will be concentrated on various aspects of plasma physics and controlled fusion research (including fusion reactor projects), neutron scattering and the better utilization of existing research reactors and low-energy accelerators.

F.7. In the "Industrial Applications and Chemistry" sub-programme, particular attention will be paid to materials analysis, the production and utilization of isotopes and the chemistry of nuclear materials.

F. 8. The "Isotope Hydrology" sub-programme will continue to be concerned with the application of nuclear techniques in the general development of water resources, but there will be increased emphasis on the study of ground water resources, environmental protection and the exploration of geothermal sources.

F. 9. In the "Nuclear Data" sub-programme, major efforts will be devoted to the collection and dissemination of non-neutron as well as neutron data, of nuclear data for safeguards, fusion studies and shielding design, and of cross-section and decay data for transactinium isotopes.

CO-OPERATION WITH OTHER ORGANIZATIONS

F. 10. The programme involves co-operation with the United Nations, FAO, UNESCO, WHO, WMO, UNIDO, UNEP, EURATOM, OECD(NEA) and other organizations.

STRUCTURE

F. 11. This programme consists of four sub-programmes.

Summary of manpower and costs

Table F. 3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Physics	3.3	2.3	322 000	3.3	2.3	375 200
Industrial Applications and Chemistry	5.2	2.2	399 000	5.2	2.2	465 300
Isotope Hydrology	4.2	3.2	316 400	4.2	3.2	331 500
Nuclear Data	11.3	8.3	523 600	11.3	8.3	600 000
TOTAL	24.0	16.0	1 561 000	24.0	16.0	1 772 000

SUB-PROGRAMMES

Physics

OBJECTIVE

F. 12. The objective is to provide limited consultative and evaluative services in branches of applied and fundamental physics which relate or can be related to the Agency's programme. It involves activities in the field of information exchange (meetings, publications, etc.) and, where appropriate, the preparation of special international surveys and position papers.

RESULTS TO DATE

F. 13. The Physics Section has each year devoted on average almost one man-year of effort to the evaluation and technical implementation of technical assistance projects concerned with nuclear and solid-state physics and instrumentation, to the evaluation of

candidates for fellowships, expert posts and visiting professorships, and to the evaluation of the reports later submitted by the selected candidates. About ten research contracts are being supported at any given time. Usually one major meeting, one or two panel meetings, two "standing committee" meetings and several consultants' meetings are held each year; details are provided under the three separate components of the sub-programme.

PLANS FOR 1975-76

F.14. Activities will be concentrated on topical aspects of nuclear physics, particularly those of interest to developing countries; they include applications of high- and low-energy accelerators, trace analysis by charged particles and applications of the Mössbauer effect. Work will continue in the field of plasma physics research, where it is intended to involve laboratories in countries other than those engaged in major fusion research projects by awarding research contracts on the basis of recommendations made by advisory groups. Agency assistance for research reactor projects will be reactivated, particular attention being paid to problems of research reactor utilization, preferably on a regional basis. Two advisory groups, two technical committees and a regional seminar are planned for 1975 and three advisory groups, two technical committees, a symposium and a regional seminar for 1976.

PLANS FOR 1977-80

F.15. The main lines of activity in nuclear physics, plasma physics and controlled nuclear fusion will continue, and it is probable that the radiation damage research programme will be reactivated. It is expected that work relating to controlled nuclear fusion research will expand substantially and that thermionic energy conversion will achieve greater importance. The series of international conferences on plasma physics and controlled nuclear fusion research, for which the Agency is responsible, will continue during this period.

CO-OPERATION WITH OTHER ORGANIZATIONS

F.16. The Physics Section will continue to co-operate with OECD(NEA) through the Joint NEA/IAEA International Liaison Group on Thermionic Electrical Power Generation.

STRUCTURE

F.17. This sub-programme will be divided into three components: "Nuclear physics", "Plasma and controlled fusion physics" and "Utilization of research reactors". This latter component was formerly part of the programme of the Division of Nuclear Power and Reactors.

Physics

Summary by programme components

Table F.4

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Nuclear physics	2.0	1.1	70 200	9 000	20 000	4 400	103 600
Plasma and controlled fusion physics	1.0	0.6	32 400	14 000	10 000	2 900	59 300
Research reactor utilization	0.3	0.6	17 400	7 000	40 000	2.700	67 100
Linguistic, printing and publishing services	-	-	-	-	-	92 000	92 000
TOTAL	3.3	2.3	120 000	30 000	70 000	102 000	322 000

Nuclear physics

Objective

F.18. The main objective of the Physics Section is to keep abreast of developments in nuclear physics and, where appropriate, to incorporate them into the Agency's programme. The areas of nuclear physics currently receiving the most emphasis in the programme of the Physics Section are basic nuclear fission research (where substantial progress is still being made) and the broad and ever-expanding field of nuclear techniques (such as the Mössbauer effect, which has been found to be particularly useful in microscopic studies of condensed matter and molecules).

Results to date

F.19. Major international symposia on the physics and chemistry of fission, which have become more and more concentrated on the theory of the fission process itself, have been held every four years since 1965, the last having been held in 1973. At present, two research contracts are active — one on theoretical and the other on experimental studies.

F.20. A subject of very wide interest within the general field of nuclear physics is the applications of specialized nuclear techniques, most of which have been devised and developed by nuclear physicists. The fifth in a series of international symposia on neutron inelastic scattering was held in 1972; at this symposium, the increasing scope of neutron inelastic scattering as a means of investigating solids and liquids was clearly demonstrated and important applications in the further study of magnetic properties, phase transitions and other phenomena were predicted.

F.21. A panel on Mössbauer spectroscopy and its applications held in 1971 was followed in November 1973 by one on the comparison of techniques in solid-state spectroscopy.

F.22. The utilization of low-energy accelerators is of considerable interest to some countries, and the Physics Section has convened two regional study groups on this subject — one in the Mediterranean region (1967) and one in Latin America (1971). A panel on charged-particle-induced radiative capture met late in 1972 and brought to the attention of nuclear physicists the very useful basic and applied work which can be done with relatively modest modern detectors and accelerators by well-trained experimentalists. A consultants' meeting was held in 1972 on the utilization of neutron generators. Many research contracts have been completed in the field of physics. The first co-ordinated research programme initiated by the Physics Section is devoted to trace analysis by charged-particle-induced X-ray fluorescence; this relatively new technique has demonstrated its very high sensitivity and excellent precision in simultaneous multi-element quantitative analysis and should find application in many fields, including biology, medicine and environmental studies.

Plans for 1975-76

F.23. The Physics Section will endeavour to maintain its capacity to provide consultative and evaluative services in the different branches of nuclear physics (including nuclear techniques) which are likely to be of interest to the Agency. Its capacity could be improved by the addition at a later stage of a staff member with experience in the use of Mössbauer and similar techniques.

F.24. It is proposed that a symposium be held on applications of low-energy accelerators or on neutron inelastic scattering in 1976. The former subject should be of fairly wide interest as there are low-energy accelerators and accelerator-trained nuclear physicists in many Member States; if the latter subject is chosen, the symposium will deal with recent advances in the application of neutron inelastic scattering in the study of condensed matter.

F.25. An advisory group on programmes for nuclear physics research in developing countries is proposed for 1975 and one on small computers for nuclear research for 1976.

F. 26. Research activities will be concentrated on a co-ordinated programme relating to trace analysis by charged-particle-induced X-ray fluorescence and on Mössbauer studies.

Plans for 1977-80

F. 27. It is likely that important new nuclear techniques and applications will arise. Applications of present techniques will continue to expand, and it may prove advisable to reactivate the radiation damage research programme. It is expected that the next fission symposium will be held in 1977.

Plasma and controlled fusion physics

Objective

F. 28. The objective is to provide channels for information exchange, to assist with the international co-ordination of controlled fusion research and the development of thermionic electrical power generation to the extent desired by Member States engaged in these activities and to maintain liaison with other Member States.

Results to date

F. 29. The Physics Section assisted with the establishment (in 1970) of the International Fusion Research Council and has provided the scientific secretary for its annual meetings. Although the Council has not yet undertaken large international projects, the regular meetings of leading figures in the major national fusion programmes have led to a better exchange of information and co-ordination of effort. The first draft of what it is hoped will become a major document on "Fusion Power and the Environment" has been completed and a number of additions and modifications have been suggested by the Member States involved. A first revision of the "World Survey of Major Facilities in Controlled Fusion Research" was prepared at the prompting of the Council and published by the Agency in 1973.

F. 30. The Physics Section has held a major international conference on plasma physics and controlled nuclear fusion every third year, the latest one being scheduled for October 1974. In order to prevent these conferences from falling in the same year as the conferences on the same subject organized by the European Physical Society, the Section acts in liaison with the Society, which has now suggested that the Agency's conferences take place every two years and alternate with its own conferences.

F. 31. The Section has represented the Agency in the Joint NEA/IAEA International Liaison Group on Thermionic Electrical Power Generation, which reviewed the status of national programmes in thermionics at its most recent meeting (in 1973). The Agency co-sponsored the Third International Conference on Thermionic Electrical Power Generation in 1972.

Plans for 1975-76

F. 32. The International Fusion Research Council is expected to continue its annual meetings, which should provide increasing guidance in connection with Agency programmes. As part of the Agency's activities in plasma physics and controlled fusion research, it is proposed to convene an advisory group on experimental problems in laser-induced fusion in 1975 and one on experimental programmes for fusion-related plasma physics research in countries other than those having major plasma physics research programmes in 1976. A further revision of the "World Survey of Major Facilities in Controlled Fusion Research" will be necessary. If funds are available, research contracts (probably within the framework of a co-ordinated programme) may be awarded to laboratories so that they can carry out plasma physics research (for example, heating experiments) pertinent to controlled fusion; this would require the services of an additional staff member - preferably one with experience in the high-power laser field.

F. 33. The Joint NEA/IAEA International Liaison Group on Thermionic Electrical Power Generation will meet in 1975 and 1976.

Plans for 1977-80

F. 34. It is anticipated that activity in controlled fusion research will expand greatly during this period. The Agency may be able to assist in initiating a large-scale international fusion reactor project and should continue to provide smaller countries with up-to-date information on research relating to fusion power generation. Thermionic energy conversion, particularly for space and submarine applications, may also acquire greater importance and result in increased activity on the part of the Physics Section.

Co-operation with other organizations

F. 35. Continued co-operation with OECD(NEA) through the Joint NEA/IAEA International Liaison Group on Thermionic Electrical Power Generation and with the International Fusion Research Council is foreseen.

Utilization of research reactors

Objective

F. 36. The main objective is to help developing countries to make the best use of their existing research reactors. The objectives of other Agency activities will also be served through the implementation of this sub-programme component including activities of the Division of Life Sciences, the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture and the Division of Nuclear Power and Reactors. As this component includes topics which lie not only outside the normal scope of the Physics Section but also outside what is usually considered to be the scope of physics itself, assistance from other sections within the Agency and the help of consultants will be required. The services of an additional staff member with recent experience in general reactor utilization would increase the effectiveness of the implementation of this component.

Results to date

F. 37. This component, which was initiated in 1962 within the Division of Nuclear Power and Reactors, will be transferred to the Division of Research and Isotopes in 1975. There have been a number of symposia devoted to topics falling within this component. The most recent was the symposium on irradiation facilities for research reactors, held in Teheran in 1972; the latest of a series of symposia on neutron inelastic scattering was also held in 1972 – in Grenoble. Regional meetings devoted to the general problem of research reactor utilization have been held almost every year; they have included topics such as isotope production, neutron activation analysis, nuclear, neutron and solid-state physics, and reactor operation (safety and maintenance). A study group meeting on problems of management of research reactor centres in developing countries was held in 1973. Regional co-operative programmes in research reactor utilization, such as the joint training and research programme conducted by India and the Philippines under the Agency's auspices [F.1] and the co-operative research reactor project in reactor physics under the Agreement between the Agency and the Governments of Norway, Poland and Yugoslavia (NPY project) [F.2], have been sponsored by the Agency. A co-ordinated research programme in neutron scattering involving five Member States in the Far East and South East Asia (India, Indonesia, the Republic of Korea, the Philippines and Thailand) is currently in progress under a Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology [F.3]. The 1974 programme includes an advisory group meeting on practical problems related to the availability and utilization of radioisotopes in Latin America,

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[F.1] For the text of the relevant agreement see documents INFCIRC/56 and Add. 1.
[F.2] Reproduced in documents INFCIRC/55 and Add. 1.
[F.3] See document INFCIRC/167.

a meeting on the future orientation of nuclear research institutes in connection with the implementation of nuclear power programmes in developing countries and a study tour in the Soviet Union on the utilization of nuclear research reactors.

Plans for 1975-76

F.38. First of all, to reactivate this component in its new setting, a programme of scientific and technical activities to be promoted will be elaborated in detail and problems of research reactor utilization which might be approached on a regional or international basis will be identified. In addition to more firmly established topics such as isotope production and neutron activation analysis, it is expected that the programme will stress promising new opportunities for the exploitation of reactor radiations (neutrons and gamma rays) such as neutron scattering studies of molecular dynamics, studies based on activable tracers, and irradiation effects produced by tailored neutron and gamma-ray spectra. Possibilities for training courses devoted to the better utilization of research reactors will be considered. Later in 1975, a regional meeting of the seminar type on research reactor utilization will be organized in an appropriate region — for example the Middle East, where there are a number of relatively new research reactors and also older ones for which new programmes are being sought. The topics covered will include in particular neutron diffraction studies, isotope production and biological applications.

F.39. It is proposed to convene an advisory group to consider in greater depth a narrower topic such as neutron scattering for molecular studies in 1976, by which time neutron scattering techniques should have become a major tool in studies of the properties and dynamics of molecules; one of the aims will be to ensure that methods developed in laboratories in advanced countries become adopted by laboratories in developing countries. Later in 1976, it is proposed to hold a regional seminar in the Far East within the framework of the above-mentioned Regional Co-operative Agreement; progress in fields such as neutron scattering, isotope utilization and irradiation studies would probably be summarized and future work planned at this seminar.

F.40. The above-mentioned co-ordinated research programme in neutron scattering, which at present involves research contracts with five developing countries, will be expanded. A similar co-ordinated programme could be organized, again at a high scientific level, in another region.

Plans for 1977-80

F.41. It is believed that there will be a continuing need in many of the developing countries for assistance in the utilization of research reactors; the programme for 1977-80 will be prepared in the light of the situation at that time.

Industrial applications and chemistry

OBJECTIVE

F.42. The objective is to serve the Member States in their efforts to use radioactive and stable isotopes and radiation for industrial purposes, to establish and/or increase capabilities for analysis (with emphasis on nuclear-based techniques in the determination of trace substances), to resolve practical problems of isotope production and distribution, and to carry out research and development work involving radiochemistry, radiation chemistry, nuclear chemistry and the chemistry of nuclear materials.

RESULTS TO DATE

F.43. The principal activities during the 1973-74 period have consisted in preparing programme plans, initiating their implementation and completing activities already initiated.

In 1973, a symposium was held on new developments in radiopharmaceuticals and labelled compounds and panels were held on practical aspects of neutron activation analysis and reference methods for marine radioactivity studies (organized in collaboration with the Monaco Laboratory); counsultant group and study group meetings were held on various aspects of nuclear fuel analysis, the production of labelled compounds and radionuclides, analytical quality control and the use of high-level radiation for the treatment of sewage and water resources; meetings to co-ordinate research activities and results were held, and also a training course on tracer techniques in industrial and environmental pollution. A symposium, a panel, study and consultant group meetings, and research co-ordination meetings are taking place in 1974.

F.44. A thorough review designed to indicate which activities in the field of industrial applications are appropriate to the Agency was carried out in 1974 in the light of experience, the need for co-ordination with UNDP and UNIDO, and the changing requirements of Member States.

PLANS FOR 1975-76

F.45. Over-all technical and management responsibility for UNDP projects which are being implemented by the Agency and involve industrial applications of isotopes and radiation will be provided under this sub-programme, the Division of Technical Assistance continuing to provide administrative services. Three advisory groups, a symposium and a seminar are planned for 1975 and three advisory groups and a seminar for 1976.

RELATED ACTIVITIES

F.46. Research under contract will, if the necessary funds are available, be expanded so as to broaden the current co-ordinated research programmes. Direct liaison will be established with UNIDO regarding industrial development problems in relation to which the Agency's expertise in applications of isotopes and radiation can be integrated with UNIDO's larger-scale efforts.

PLANS FOR 1977-80

F.47. It is expected that the activities constituting the components of this sub-programme will continue, with modifications reflecting new developments.

CO-OPERATION WITH OTHER ORGANIZATIONS

F.48. This sub-programme involves co-operation with various organizations of the United Nations family and with national and regional organizations, as indicated in the descriptions of the separate components.

STRUCTURE

F.49. This sub-programme, which combines the former "Chemistry" and "Industrial Applications" sub-programmes, was established in September 1972. The six components of the former sub-programmes have been combined into three new components so as to reflect more adequately the emphasis of the new sub-programme. Thus, the "Mineral resources" component, some aspects of the "Reactor chemistry" component and the "Pollution studies" component proposed for 1974 have been merged to form the new component entitled "Materials analysis"; the components entitled "The production and utilization of radioisotopes" and "Radiation processing" have been brought together to form the new component

entitled "Production and utilization of isotopes"; lastly, the components entitled "The thermodynamics of nuclear materials" and "The analytical chemistry of nuclear materials", and also the remaining aspects of the "Reactor chemistry" component, have been merged to form the new component entitled "Chemistry".

Industrial applications and chemistry

Summary by programme components

Table F. 5

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Materials analysis	2.5	1.0	96 700	28 000	20 000	5 300	150 000
Production and utilization of isotopes	1.1	0.6	35 000	30 000	25 000	4 000	94 000
Chemistry	1.6	0.6	49 300	-	10 000	3 700	63 000
Linguistic, printing and publishing services	-	-	-	-	-	92 000	92 000
TOTAL	5.2	2.2	181 000	58 000	55 000	105 000	399 000

Materials analysis

Objective

F. 50. Many Member States are deeply interested in problems such as industrial pollution, industrial quality control and the prospection and development of natural resources, where facilities for the accurate determination of low to trace concentrations of the materials of interest are required. This component is concerned with the use of nuclear-based methods and instrumentation in helping to establish the necessary analytical capabilities in Member States, with some emphasis on applications in mineral resources programmes.

Results to date

F. 51. The direction since 1972 has been towards the introduction of a multi-disciplinary approach in materials analysis, so that laboratories in developing countries can avoid excessive dependence on a single analytical technique; a strong impetus in this direction was provided in 1973 by a panel on practical aspects of activation analysis. In addition, work in the related areas of analytical quality control and reference materials has been done in co-operation with the Seibersdorf Laboratory; a consultants' meeting was held in 1973, and co-ordination activities are being undertaken in co-operation with various national and international bodies.

F. 52. In the field of mineral resources, the Agency has continued to give direct support to national programmes when appropriate and kept Member States informed of developments. Since 1968 three publications dealing with broad aspects of mineral exploitation and exploration have appeared in the Agency's Proceedings Series and two in the Technical Reports Series. A panel on the application of nuclear techniques in geochemistry and geophysics is being held in 1974.

Plans for 1975-76

F. 53. The Agency will continue providing support to developing Member States in their research and development efforts aimed at the application of nuclear-based techniques as complementary tools in industrial processes. Consultant services and direct support with regard to the establishment of new laboratories or the expansion of existing facilities for trace element analysis and for applications requiring the analysis of materials by nuclear-based methods are planned. An advisory group meeting on nuclear instrumentation is expected to be held in 1975. A symposium on nuclear techniques in raw materials industries is proposed for 1975 and one on nuclear-based methods for pollution monitoring and control for 1976; an advisory group on selected aspects of nuclear-based techniques applied to materials analysis is also planned for 1976. Assistance in the local or regional organization of supporting activities, such as the training of programmers for small computers and of electronic technicians, and the intensification of services involving analytical quality control, sampling and statistical techniques are proposed. It is expected that the large-scale UNDP project for the establishment in Argentina of a national institute for non-destructive testing and quality control will be included in this component in 1975.

Related activities

F. 54. A co-ordinated research programme initiated in 1970 has been extended under the new title "Co-ordinated Programme on Nuclear-based Techniques in Geology and Mineral Prospecting"; this is one of the four co-ordinated research programmes currently active in the field of physical sciences. A co-ordinated programme initiated in 1970 within the former Chemistry Section and now involving five research contracts and two research agreements has been modified and extended under the new title "Co-ordinated Programme on Nuclear-based Methods for Trace Element Analysis"; it deals with trace element analysis in relation to environmental studies and other areas of applied science. Technical advice will continue to be provided for technical assistance programmes.

Plans for 1977-80

F. 55. The trend in mineral processing appears to be towards plants of larger throughput which may have to process lower-grade ores. It is anticipated that the use of process control with on-line radioisotope sensors and small on-line computers, or with a computer system for central plant control, will increase. Nuclear-based methods being developed for the off-shore exploration of sea-bed mineral deposits may also increase in importance during this period. An expansion or other modification of the activities consituting this component will depend on practical developments.

F. 56. With regard to analytical quality control, it is anticipated that by 1977 a recent recommendation that the Agency act as a clearing-house for information on the availability of reference materials for trace element analysis will have been implemented as a continuing service project. An increase in activities connected with environmental pollution may be expected. UNDP projects will continue to be serviced when necessary.

Co-operation with other organizations

F. 57. This component involves co-operation with UNIDO, ECOSOC's Committee on Natural Resources, UNEP and various national and international organizations concerned with standards and reference materials.

Production and utilization of isotopes

Objective

F. 58. Nuclear reactors and accelerators in many Member States could be used more in the production of radioisotopes if markets existed for them. This component is concerned with the identification of technical problems of industrial development to which radioisotope techniques offer a practical and – for the Member State(s) involved – economically

competitive (or perhaps even a unique) solution and with the identification of administrative, legal and logistic problems which are delaying the introduction of radioisotope techniques already in use elsewhere and but for which a market for radioisotopes would exist.

Results to date

F. 59. This component, initiated in 1961, encompasses several areas of activity. Major emphasis continues to be on the production and control of radiopharmaceuticals incorporating both accelerator- and reactor-produced isotopes. Activities concerned with the use of isotopes as tracers and as sealed radiation sources in industry were initiated in 1966. During the past few years, training courses, symposia, study groups, panels and consultants' meetings have been organized in these fields. A symposium on new developments in radiopharmaceuticals and labelled compounds, a study group on radiation engineering in the academic curriculum and a training course on tracer techniques in industrial and environmental pollution studies were organized in 1973. A study group with the subject title "Utilization of Research Reactors - Production and Distribution of Radioisotopes" has been planned for 1974 by the Division of Research and Laboratories in co-operation with the Division of Nuclear Power and Reactors.

Plans for 1975-76

F. 60. Increased attention will be paid to industrial and environmental applications of radioisotope sources — for example, in chemical processing and sewage sterilization. A seminar on research and development work relating to the use of high-level radiation in the treatment of domestic sewage, industrial waste water and water resources is planned for 1975 (the Division of Life Sciences also has an interest in this subject). An advisory group on applications of isotope techniques in waste treatment is also planned for 1975. Administrative and operational aspects of regional co-operation in the production and distribution of radioisotopes are expected to be emphasized; in this connection it is proposed to hold in 1976 a regional seminar on the production and distribution of radioisotopes in Africa or the Far East. In response to the great need for increasing the availability and promoting the use of separated stable isotopes, which are proving to be very powerful research tools in the biological and agricultural fields, it is proposed to hold a symposium on stable isotope production, measurement and utilization in biological applications in 1976 in co-operation with the Division of Life Sciences.

Related activities

F. 61. It is expected that several research contracts will be awarded and research agreements concluded in 1975-76 under a co-ordinated research programme on the preparation and quality control of radiopharmaceuticals; in addition, advisory groups on related subjects will be convened during this period. Technical advice and services in relation to technical assistance programmes will be provided, and training courses on the preparation and control of radiopharmaceuticals have been suggested for 1975-76.

Plans for 1977-80

F. 62. The programmes in the field of radiopharmaceuticals will be strengthened, account being taken of expected needs and developments and of the long-term recommendations of a consultants' meeting held in 1973. Activities related to industrial applications of ionizing radiation, sealed sources and isotopic tracers will continue, with an effort to follow up earlier results. Scientific meetings and technical reports will continue to play an important role in this programme.

Co-operation with other organizations

F. 63. This component involves co-operation with WHO and the Asociación Latino-Americana de Sociedades de Biología y Medicina Nuclear (Latin American Association of Nuclear Medicine and Biological Societies) in the field of radiopharmaceuticals.

Chemistry

Objective

F. 64. In those Member States directly involved in the development of advanced nuclear reactor concepts, the chemistry of nuclear fuel materials has a high priority; in Member States seeking to increase their capabilities in atomic energy, a strong scientific base in the fields of radiochemistry, radiation chemistry and nuclear chemistry is vital. The purpose of this component is to define critical problems of chemistry in the development of nuclear technology, to assist Member States in co-ordinating common aspects of their programmes, to establish facilities, and to build up teams of trained scientists able to initiate and develop national atomic energy programmes.

Results to date

F. 65. The thermodynamics of nuclear materials (a subject introduced in 1961) and the analytical chemistry of nuclear materials (a subject introduced in 1969) are the main elements of this component. A panel on the behaviour and chemical state of irradiated ceramic fuels was held in 1972 and a symposium on the thermodynamics of nuclear materials is being held in 1974; a panel on the theory of hot-atom chemistry is also planned for 1974.

F. 66. A consultants' meeting on standard reference material for nuclear fuel analysis held late in 1972 gave a new direction to activities connected with the analytical chemistry of nuclear fuels, a subject which has been explored by a panel in 1970 and a symposium in 1971. Intercomparisons of computer codes for predicting the chemical composition of irradiated nuclear fuels and of the results of analyses of uranium and plutonium oxide materials are expected to be initiated in 1974.

Plans for 1975-76

F. 67. The intercomparisons expected to be initiated in 1974 will be completed during this period. It is expected that the Agency will co-operate with EURATOM in a symposium on research materials for nuclear measurements which EURATOM proposes to hold in 1976. An advisory group on questions concerning irradiated nuclear fuels (for example, the analysis or chemical reprocessing of such fuels) is proposed for 1976. The Agency is expected to play a greater role in co-ordinating the compilation of thermodynamics data and making reference materials available. The need for special technical reports designed to assist Member States will be explored.

Related activities

F. 68. The number of requests for help in establishing nuclear materials analysis capabilities is expected to increase. The necessary services in connection with technical assistance will continue to be provided. It is anticipated that several research contracts will be initiated in 1975.

Plans for 1977-80

F. 69. The activities constituting this sub-programme component will be extended, in co-operation with other Divisions and Sections, to cover aspects of nuclear fuel reprocessing and the chemistry and materials science problems of fusion reactor technology.

Co-operation with other organizations

F. 70. This component involves co-operation with various national bodies and with organizations such as EURATOM.

Isotope hydrology

OBJECTIVE

F.71. The objective is to encourage the use of isotopic techniques in hydrological investigations, to promote the refinement of existing methods and the development of new techniques and to increase the number and variety of useful applications.

RESULTS TO DATE

F.72. The multi-disciplinary team involved in the activities constituting this sub-programme advises developing countries requesting assistance with water resources development projects on the use of isotope techniques. Agency expertise and laboratory facilities have supplemented the aid given to countries under the technical assistance programme. For example, Agency staff members have initiated field studies in Mexico and some of the related analytical work is being done at the Agency's Laboratory until the analtyical facilities being established in Mexico under the technical assistance programme are fully operational. As part of the over-all programme of assistance, fellows attached to the Section of Isotope Hydrology have received training while working on projects initiated in their home countries.

F.73. Problems associated with the development of ground-water resources remain the main subject of sub-contractual arrangements with other organizations of the United Nations family executing large-scale UNDP projects. In 1973, studies continued or were completed in the Canary Islands, Jamaica, Lebanon, Mali, Mauritania and Togo. In these studies, isotope techniques have been used to solve questions concerning the recharge and origin of waters.

F.74. Because hydrologists are the ultimate users of isotope techniques, a regional seminar was held in Mexico in 1973 for hydrologists working at the management level to acquaint them with the capabilities of a broad range of isotope techniques.

F.75. A symposium on isotope techniques in ground-water hydrology was held in Vienna in March 1974.

F.76. The Laboratory has been providing analytical support for co-operative field studies in Member States and compiling basic data derived from the IAEA/WMO isotopes-in-precipitation survey. The distribution of standards for the intercomparison of stable isotope (deuterium and oxygen-18) and tritium measurements has continued.

PLANS FOR 1975-76

F.77. Data collection from the network of IAEA/WMO stations will continue. The network will be modified so as to co-ordinate the objectives of the survey with those of the programme proposed to UNEP.

F.78. The number of requests for technical assistance in the application of nuclear techniques to water resources development and environmental pollution problems is expected to increase. The Agency will use its staff for short assignments and continue to provide laboratory services in connection with the technical assistance programme. The impact of Agency assistance will be increased through the use of inter-disciplinary teams of staff members to advise on the planning and execution of isotope hydrology projects. Emphasis will be placed on follow-up missions to consolidate newly established projects in developing countries; experience has shown that short advisory visits are particularly helpful after the initial assistance has formally ceased.

F.79. Nuclear techniques applicable in hydrological studies will find widespread application in the field of environmental protection, particularly in relation to the movement,

transport and accumulation of pollutants in surface waters and ground waters. The Agency's role will be broadened to include the provision of consulting services and laboratory facilities for studies of the pollution of ground waters, reservoirs and lakes. An advisory group meeting will be convened in 1976 to review progress in the application of nuclear techniques in water pollution studies.

F. 80. Collaboration with UNESCO under the IHD programme is expected to continue within the framework of a long-term "International Hydrological Programme", which is planned as an extension of the IHD programme. Technical committe meetings in connection with the "International Hydrological Programme" are proposed for 1975 and 1976.

F. 81. The application of isotopes in mining hydrology will be studied with a view to using them in determining the origin of water in mines and solving problems related to the disposal of highly mineralized mine waters. An advisory group on the application of isotopes in mining hydrology, including problems of liquid mine wastes, will be convened in 1976.

F. 82. The world-wide demand for more energy and the interest in possible new sources have resulted in the widespread exploration of geothermal sources. Recent progress in the application of nuclear techniques to hydrological problems associated with the exploration of geothermal areas, the interpretation of findings and the subsequent development of promising areas will be reviewed by an advisory group in 1975.

F. 83. The Section of Isotope Hydrology will continue with its efforts to determine what possibilities are offered by the use of variations in the ratio $^{234}U/^{238}U$ in hydrological studies and what the limitations are. Laboratory capabilities will continue to be increased as new advances in environmental isotope technology are made.

F. 84. The Agency will continue to undertake investigations concerning the mathematical modelling of tracer input-output relations for the quantitative interpretation and evaluation of hydrological parameters in different hydrological systems and will examine the economics of nuclear logging, especially when used in the lithological investigation of old cased wells.

F. 85. A symposium on the application of isotope techniques in surface water studies, including the study of sediment transport and water pollution problems, is planned for 1976.

RELATED ACTIVITIES

F. 86. Research contracts will be awarded and research agreements concluded to the extent permitted by the limited funds available. The Agency will play a catalytic role in encouraging bilateral arrangements between institutes with considerable experience and laboratory capability in isotope hydrology and institutes in the developing countries which have only recently embarked upon isotope hydrology work.

PLANS FOR 1977-80

F. 87. Emphasis will continue to be placed on disseminating information and on utilizing to the maximum the potential of the Agency's staff and laboratory facilities in dealing with the problems of developing countries. It is expected that the follow-up action mentioned in paragraph F. 78 above will enable know-how to be transferred more effectively to newly established national or regional groups.

F. 88. The long-term "International Hydrological Programme" to be launched by UNESCO at the end of the IHD will have been under way long enough for it to have become clear what form of co-operation is expected of the Agency.

CO-OPERATION WITH OTHER ORGANIZATIONS

F. 89. This sub-programme involves co-operation with the United Nations, FAO, UNESCO, WHO, WMO and possibly UNEP.

Isotope hydrology

Table F. 6

	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Isotope hydrology	4.2	3.2	158 200	14 500	47 000	11 700	231 400
Linguistic, printing and publishing services	-	-	-	-	-	85 000	85 000
TOTAL	4.2	3.2	158 200	14 500	47 000	96 700	316 400

Nuclear data

OBJECTIVE

F. 90. The objective is to promote the world-wide exchange, evaluation and dissemination of nuclear data, to assess nuclear data requirements and to further national programmes of nuclear data for peaceful applications.

RESULTS TO DATE

F. 91. The main results of the work done during the past six years are the publication of CINDA and other handbooks, the development of the computer-based EXFOR system for the exchange of experimental neutron data, the dissemination of evaluated neutron data, the review of national activities in the field of neutron data evaluation, reviews of important standards for neutron data measurements and reactor design, the compilation of nculear data requests (WRENDA project) in connection with reactor design, safeguards and fusion studies, the procurement for developing countries of samples for nuclear data measurements using accelerators, a first review of nuclear data requirements for radioisotope applications, activation analysis and other non-energy purposes, and the beginning of the co-ordination of the compilation and exchange of important non-neutron nuclear data.

PLANS FOR 1975-76

F. 92. The collection and dissemination of neutron data and associated information will continue. In addition, considerable effort will be devoted to achieving an unrestricted international exchange of evaluated neutron data, to co-ordinating the compilation and exchange of non-neutron nuclear data important in nuclear applications, to reviewing nuclear data needs and preparing request lists for non-energy purposes and to promoting nuclear data measurements in developing countries. National institutions in about 45 Member States are expected to request and supply nuclear data. It is proposed to continue the annual meetings of the International Nuclear Data Committee, which advises the Director General on questions concerning nuclear data.

PLANS FOR 1977-80

F.93. Work will continue in accordance with the recommendations of the International Nuclear Data Committee, which will meet annually, with the Agency providing the scientific secretariat. An international nuclear data conference is proposed for 1977.

CO-OPERATION WITH OTHER ORGANIZATIONS

F.94. The programme, which is formulated jointly with the International Nuclear Data Committee, involves close co-operation with the following major regional nuclear data centres: USAEC Technical Information Center (TIC), United States National Neutron Cross Section Center (NNCSC), United States Nuclear Data Project (NDP), OECD(NEA) Neutron Data Compilation Centre (NDCC), and Soviet nuclear data centres in Obninsk, Moscow and Leningrad. It also involves co-operation with the European-American Nuclear Data Committee (EANDC), the EURATOM Central Bureau for Nuclear Measurements (Bureau Central de Mesures Nucléaires - BCMN) and the ICSU Committee on Data for Science and Technology.

STRUCTURE

F.95. The five components formerly comprising this sub-programme are being rearranged to form three components which are described in the following paragraphs.

Nuclear data

Summary by programme components

Table F.7

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Neutron nuclear data	6.1	4.7	221 200	-	-	26 500	247 700
Non-neutron nuclear data	1.1	0.5	31 100	12 000	-	1 400	44 500
Data review and measurement	4.1	3.1	138 800	10 000	-	2 800	151 600
Not attributable to any particular programme component	-	-	-	4 500	-	18 300	22 800
Linguistic, printing and publishing services	-	-	-	-	-	57 000	57 000
TOTAL	11.3	8.3	391 100	26 500	-	106 000	523 600

Neutron nuclear data

Objective

F.96. The objective is to compile and exchange experimental and evaluated neutron data, to make these data available upon request to countries in the Nuclear Data Section's service area and to co-ordinate the activities of regional data centres.

F.97. Recently, the collection and dissemination of evaluated neutron data has become a routine operation as in the case of experimental neutron data. Furthermore, the neutron data requests being received by the Agency relate more and more to both experimental and evaluated neutron data. It therefore seems logical to combine the former components "Experimental neutron data" and "Evaluated neutron data" into a single component entitled "Neutron nuclear data", as distinct from the component entitled "Non-neutron nuclear data".

Results to date

F.98. CINDA, the reference handbook for neutron data, has been developed as an international undertaking and been published annually by the Agency since 1970. CINDA 73 contains 95 000 reference entries.

F.99. EXFOR, the computer-based system for the world-wide exchange of experimental neutron data, has been in operation since July 1970. Last year 2800 data sets with 170 000 data lines were supplied upon request to 16 countries in the service area of the Nuclear Data Section. Computer programmes for storage, checking, retrieval and editing have been developed and provided upon request to other data centres.

F.100. A handbook has been published on nuclear data for activation analysis.

F.101. A free exchange of evaluated neutron data has been achieved for standard neutron cross-sections and for the Karlsruhe Evaluated Neutron Data Library; in addition, a free exchange of selected data from Australia, Hungary, Italy, the Soviet Union and the United Kingdom has been achieved. Last year 1700 data sets with 500 000 data lines were supplied upon request to 15 countries in the service area of the Nuclear Data Section. A world-wide survey of the position as regards evaluated neutron data, and especially of the needs in this field, was carried out in 1971.

Plans for 1975-76

F.102. Emphasis will be placed on neutron data needs for reactor and shielding design, safeguards and fusion studies. Co-ordination will be achieved through annual meetings of representatives of the neutron data centres involved.

F.103. The collection and dissemination of evaluated neutron data will increase as a result of an expected gradual release of such data from growing national data files. Efforts directed at achieving the unrestricted exchange of all evaluated neutron data will continue.

Plans for 1977-80

F.104. The compilation work load will remain at the same level. Neutron data for non-reactor applications will grow in importance. In addition, as a result of the foreseeable growth in data scope it will be necessary to intensify co-operation with other specialized data centres, due regard being paid to non-neutron nuclear data requirements.

Non-neutron nuclear data

Objective

F.105. The objective is to co-ordinate the compilation, evaluation, exchange and dissemination of non-neutron nuclear data of importance in nuclear applications.

Results to date

F.106. This component was initiated in 1970. The International Working Group for Nuclear Structure and Reaction Data, which was convened by the Agency in 1972, and the Agency's

Symposium on Applications of Nuclear Data in Science and Technology, which was held in 1973 and was prepared by members of the international working group and the International Nuclear Data Committe, established a first broad picture of nuclear data user requirements in a variety of applications and of current national compilation and evaluation activities.

Plans for 1975-76

F.107. The work of co-ordination started in 1974 will continue through seminars attended by representatives of nuclear data centres.

Plans for 1977-80

F.108. In response to the increase in the number of applications of nuclear radiations in science and industry, the Nuclear Data Section will start compiling non-neutron nuclear data from countries in its service area. It will continue with the international exchange and dissemination of such data.

Data review and measurement

Objective

F.109. The objective is to review and evaluate standard nuclear data of major importance in nuclear science and technology, to assess nuclear data needs for various applications and to promote measurements of requested nuclear data.

F.110. The former components "Data review" and "Requests for measurements and samples" are being combined into one component, because future reviews will be concerned mainly with the status and requirements of nuclear data measurements and evaluations and will thus be more closely related to the request lists to be compiled and edited as one of the activities constituting the earlier "Requests for measurements and samples" component.

Results to date

F.111. Reviews of nuclear standards for neutron data measurements and of important standard and reactor nuclear data have provided the basis for further research and have helped to clarify discrepancies in experimental data; "best" values for use in reactor design were published in Atomic Energy Review, Vol. 10, No. 4. Computer programmes for data evaluation have been developed or adapted.

F.112. Twenty-three countries provided input to the first nuclear data request list for reactors (WRENDA 73). Similar request lists have been issued for safeguards and fusion. Seven developing countries have been assisted in obtaining samples for nuclear data measurements using accelerators.

Plans for 1975-76

F.113. Earlier nuclear data evaluations for reactors will be up-dated. Nuclear data for shielding design and transactinium isotope cross-section and decay data will be reviewed for the first time; an advisory group on nuclear data for transactinium isotopes is planned for 1975. The third advisory group meeting to review nuclear standards reference data will be held in 1976. Other reviews will be performed as the need arises.

F.114. WRENDA lists – containing nuclear data requests for reactor design, safeguards and fusion studies – will be up-dated and published annually. Request lists relating to nuclear data for non-energy purposes will be compiled in co-operation with the International Nuclear Data Committee. Nuclear data measurements will be promoted, particularly in developing countries, and assistance in obtaining the samples needed for such measurements will continue.

Plans for 1977-80

F.115. WRENDA lists – containing nuclear data requests for national nuclear energy programmes – will continue to be published annually. The review of universally important nuclear data will continue concurrently. Request lists relating to nuclear data for non-energy purposes will be consolidated. The targets and samples programmes in support of nuclear data measurements in developing countries will continue.

F.116. A conference on nuclear data for applications in science and technology is under consideration for 1977.

G. THE LABORATORY

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table G.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	982 579	1 056 000	142 000	10 000	152 000	1 208 000	1 400 000
Overtime	1 495	7 500	500	(4 300)	(3 800)	3 700	4 000
Temporary assistance	2 884	800	100	100	200	1 000	1 000
Sub-total	986 958	1 064 300	142 600	5 800	148 400	1 212 700	1 405 000
Common staff costs	321 043	340 900	47 400	2 700	50 100	391 000	450 500
Travel	3 266	3 700	300	-	300	4 000	4 500
Scientific and technical contracts	10 269	1 100	200	10 000	10 200	11 300	12 000
Scientific supplies and equipment	123 413	202 000	20 000	(9 000)	11 000	213 000	260 000
Common services, supplies and equipment	151 833	170 000	14 000	68 000	82 000	252 000	280 000
Other items of expenditure							
Other	25 845 [a/]	-	-	-	-	-	-
Sub-total	1 622 627	1 782 000	224 500 12.6%	77 500 4.4%	302 000 17.0%	2 084 000	2 412 000
Less:							
Amount transferred to Safeguards	361 000	334 000	37 000	15 000	52 000	386 000	438 000
TOTAL	1 261 627	1 448 000	187 500 12,9%	62 500 4.3%	250 000 17.2%	1 698 000	1 974 000
Data processing services	4 083	6 000	-	-	-	6 000	7 000

a/ Co-operative agreement in respect of tsetse fly control.

SUMMARY OF MANPOWER

Table G. 2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
P-5	5	5	5	-	5	5
P-4	11	12	12	-	12	12
P-3	7	6	6	-	6	6
P-2	5	5	5	-	5	5
P-1	2	2	2	-	2	2
Sub-total	30	30	30	-	30	30
GS	52	52	52	3	55	59
M&O	21	22	21	1	22	24
TOTAL	103	104	103	4	107	113

CHANGES IN COSTS AND MANPOWER

Costs

G.1. The total cost of this programme is expected to increase by $302 000, of which $224 500 will be required to cover price increases and $77 500 represents a programme increase. As will be seen from Table G.1 above, the programme increase is attributable to the establishment of the safeguards analytical laboratory. In order to give a complete picture of the total cost of safeguards work, the cost of the support provided by the Laboratory is transferred to the Safeguards programme.

G.2. Of the programme increase, an amount of $12 700 is for salaries and related common staff costs. The additional cost of three GS posts and one M&O post for the safeguards analytical laboratory is partly offset by delays in the recruitment of Professional staff. The increase in respect of contractual services is almost offset by a reduction in the cost of scientific supplies and equipment. The programme increase of $68 000 for common services, supplies and equipment is the net result of an additional requirement for the safeguards analytical laboratory of about $90 000 and a reduction mainly in the provision for the electronics and workshop services.

Manpower

G.3. The transfer of one M&O post for a cleaner from the Laboratory manning table to the General Services programme has been reflected in the adjusted manning table for 1974. In 1975 three additional GS posts and one M&O post are required for the safeguards analytical laboratory. It is expected that three GS and two M&O posts will be required for 1976 for the safeguards analytical laboratory and one GS post for work in hydrology.

THE PROGRAMME

OBJECTIVE

G.4. The objective of the Laboratory is to provide support for the various technical programmes, such as analytical services, calibration of radionuclides and development of techniques involved in the Agency's activities, including safeguards work.

STRUCTURE

G.5. This programme consists of seven sub-programmes. The "Medical Applications" sub-programme is dealt with under the "Life Sciences" programme (under the components entitled "Applications in nutrition studies", "Applications of activation analysis" and "Applications of in vitro assay techniques" [G.1]). The "Isotope Hydrology" sub-programme is dealt with under the "Physical Sciences" programme [G.2]. The remaining five sub-programmes are dealt with separately below.

Summary of manpower and costs

Table G.3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Metrology	4.0	6.0	232 000	4.0	6.0	273 000
Chemistry	7.0	7.0	400 700	7.0	9.0	484 000
Isotope hydrology, including training	4.0	8.0	266 800	4.0	9.0	310 000
Medical applications and dosimetry	2.0	5.0	202 000	2.0	5.0	234 000
Agriculture	8.0	9.0	450 000	8.0	9.0	497 000
Electronics and workshop services	2.0	8.0	220 500	2.0	8.0	260 000
Safeguards analytical laboratory	3.0	9.0	312 000	3.0	10.0	354 000
TOTAL	30.0	52.0[a]	2 084 000	30.0	56.0[a]	2 412 000

a/ Excludes 3 GS posts for administration and library.

[G.1] See paragraphs E.14., E.23., E.27., E.50., E.51. and E.53.
[G.2] See paragraphs F.72., F.76., F.78. and F.83.

Summary by programme components

Table G.4

Programme component	Man-years P	Man-years GS	1975 Cost estimates: Staff	Scientific supplies and equipment	Other	Total
Metrology						
Provision of intercomparison service for radionuclide standards to institutes in Member States	2.6	4.0	107 700	7 000	30 300	145 000
Distribution of materials for reactor fluence measurement	1.0	1.0	35 000	7 000	12 000	54 000
Provision of assistance to the Safeguards programme	0.4	1.0	28 000	1 000	4 000	33 000
Sub-total	4.0	6.0	170 700	15 000	46 300	232 000
Chemistry						
Provision of assistance to the Safeguards programme	-	0.5	12 000	-	2 000	14 000
Provision of assistance to the Agricultural Section of the Laboratory in chemical matters	2.3	2.0	91 000	5 000	26 000	122 000
Provision of assistance in analytical chemistry to other Sections, UN organizations and Member States	2.3	2.5	110 000	5 000	21 700	136 700
Establishment and provision of analytical quality control samples of nuclear interest to institutions in Member States	2.4	2.0	97 000	5 000	26 000	128 000
Sub-total	7.0	7.0	310 000	15 000	75 700	400 700
Isotope hydrology	3.8	8.0	175 000	40 000	46 800	261 800
Training	0.2	-	5 000	-	-	5 000
Medical applications and dosimetry	2.0	5.0	132 000	34 000	36 000	202 000
Agriculture	8.0	9.0	326 000	40 000	84 000	450 000
Electronics and workshop services						
Provision of assistance to the Safeguards programme	0.5	1.5	18 000	2 000	5 000	25 000
Other	1.5	6.5	142 000	30 000	23 500	195 500
Sub-total	2.0	8.0	160 000	32 000	28 500	220 500
Safeguards analytical laboratory	3.0	9.0	152 000	37 000	123 000	312 000
TOTAL	30.0	52.0[a]	1 430 700	213 000	440 300	2 084 000

a/ Excludes 3 GS posts for administration and library.

SUB-PROGRAMMES

Metrology

OBJECTIVE

G.6. The objective is to provide services to Member States and to other units of the Agency in the accurate assay of radionuclides, nuclear spectroscopy and the preparation of calibrated radioactive sources.

STRUCTURE

G. 7. This sub-programme consists of three components which are described in the following paragraphs.

Provision of an intercomparison service for radionuclide standards to institutes in Member States

Objective

G. 8. The objective is to assist Member States in radionuclide standardization and related matters.

Results to date

G. 9. This component was initiated in 1970. Services were provided for 40 Member States in the period 1970-73. Equipment with an excellent stability of the response to gamma rays (4π ionization chambers) has been set up and thoroughly tested. Calibrated samples from Member States are being received and measured; 4000 calibrated samples were received, measured and distributed in the period 1970-73. Methods for the accurate calibration of the most commonly used radionuclides have been worked out.

Plans for 1975-76

G. 10. Samples of a variety of radionuclides are expected to be received in increasing numbers from Member States. Compilations enabling institutes to compare their calibration results with the previous results from other institutes will be circulated at regular intervals. This service will be extended to cover beta-emitting standards through the setting up of suitable apparatus.

Plans for 1977-80

G. 11. This activity is of a continuing nature. The wealth of information gathered over the years will make the work even more useful.

Distribution of materials for reactor neutron fluence measurements

Objective

G. 12. The objective is to help reactor centres, especially those in developing countries, in the determination of the fluence and the spectrum of "in-pile" neutrons.

Results to date

G. 13. This component was initiated in 1966. Twelve different types of "kits" have been made available to Member States, which have ordered a total of 688 "kits". Each "kit" consists of several activation foils and a standard source of the radionuclide produced by the neutron irradiation.

Plans for 1975-76

G. 14. New items will be incorporated in the distribution programme, especially those with low activation thresholds (e. g. ^{103m}Rh).

Plans for 1977-80

G. 15. Future work will depend upon the demand for this service.

Provision of assistance to the Department of Safeguards and Inspection

Objective

G.16. The objective is to develop and apply radiometric methods for analysing samples of interest for safeguards purposes.

Results to date

G.17. This component was initiated in 1965. Alpha and gamma spectrometry were used for the determination of the isotopic composition of plutonium samples and for testing the chemical separation of plutonium from uranium and americium. These techniques will be complementary to mass spectrometry in the routine analysis of safeguards samples. In addition, the performance of safeguards equipment is regularly tested.

Plans for 1975-76

G.18. With the completion of the safeguards analytical laboratory building, equipment and techniques will be adapted to carry out routine measurements. The character of the work will shift to routine analysis. Nuclear material other than that mentioned above may also be analysed.

Plans for 1977-80

G.19. The work is expected to increase as safeguards activities develop.

Chemistry

OBJECTIVE

G.20. The objective is to advise and assist Member States, other units of the Agency and other United Nations organizations in chemistry, particularly analytical chemistry.

STRUCTURE

G.21. This sub-programme consists of four components which are described in the following paragraphs.

Provision of assistance to the Department of Safeguards and Inspection

Objective

G.22. The objective is to provide chemical laboratory support, particularly analytical, to the Department of Safeguards and Inspection.

Results to date

G.23. This component was initiated in 1965. Methods have been developed and applied for the determination of uranium and plutonium in safeguards samples. In 1972 approximately 200 and in 1973 about 400 samples were analysed. In 1973 a mass-spectrometer for the determination of isotopic ratios of uranium and plutonium was established and tested. The Laboratory has participated in an international intercomparison for the determination of uranium and plutonium and has organized an intercomparison for the chain of safeguards national network laboratories, in which it also participates. Investigations into optical methods for the determination of impurities in uranium and plutonium and of their isotopic composition by atomic absorption spectroscopy were commenced but were somewhat delayed because of lack of equipment and personnel. Health physics measurements (e.g. the determination of plutonium in urine etc.) are carried out on a routine basis, on staff members who are exposed to plutonium.

Plans for 1975-76

G.24. With the installation of a network of safeguards laboratories in 1975 most of the services performed under this component will be transferred to the safeguards analytical laboratory. The assistance provided under this component will be restricted to the continuation of health physics measurements, on a routine basis, on staff members who are exposed to plutonium.

Plans for 1977-80

G.25. Health physics samples will be analysed as necessary.

Provision of assistance to the Agricultural Section of the Laboratory in chemical matters

Objective

G.26. The objective is to provide support in chemistry to the Agricultural Section.

Results to date

G.27. Mass- and emission-spectrometric methods for the determination of nitrogen-15 in agricultural and biological samples are in routine use (4000-5000 samples per year). Amino-acid analysis of the hydrolyzates of protein fractions from mutant grain strains obtained in the plant breeding programmes, involving the use of an automatic amino-acid analyser, is also carried out on a routine basis. An effort will be made to farm out some of this sampling work to laboratories in Member States in future.

Plans for 1975-76

G.28. The provision of this service will continue as required. It is expected that the demand will remain high as the interest in nitrogen-15 experiments continues to be considerable.

Plans for 1977-80

G.29. The service will continue as required.

Provision of assistance in analytical chemistry to other Sections of the Agency, other United Nations organizations and Member States

Objective

G.30. The objective is to provide support in chemistry and in related fields to other Sections of the Agency, other United Nations organizations and Member States.

Results to date

G.31. This component was initiated in 1962. The main work during the last few years consisted in making reference analyses of ore samples in support of uranium prospecting operations carried out under technical assistance programmes. In addition to uranium, equilibrium ratios of uranium daughters to uranium, thorium concentrations and, in a few cases, concentrations of accompanying metals have been determined. In the period 1970-73, 519 samples of uranium ore were submitted for testing from 14 Member States of the Agency. A total of 1900 elementary determinations were made on these samples. A method was developed for the concentration of uranium present in ng/g amounts in natural water to provide suitable samples for measurements of $^{238}U/^{234}U$ ratios for hydrological purposes. The work, in co-operation with WHO, on analytical methods for the quality control of radiopharmeceuticals and on the co-ordinated research contract programme on geochemical prospecting has been terminated.

G. 32. The amount of work carried out will depend on demand. An important factor will be the number and magnitude of technical assistance projects in uranium prospection and the degree of external analytical assistance required for them. The practical experience gained will enable laboratory staff also to continue providing advisory services to other Sections of the Agency and to Member States.

Plans for 1977-80

G. 33. Services will be provided as required.

The establishment and provision of analytical quality control samples of nuclear interest to institutes in Member States

Objective

G. 34. The objective is to assist laboratories in Member States to achieve, maintain and control analytical reliability, and to provide the necessary services to the Monaco Laboratory.

Results to date

G. 35. This component was initiated in 1964. Assistance is provided in the form of intercomparisons (6-10 per year), analysed (reference) samples and standard samples. Altogether, several thousand samples have been provided for laboratories in Member States. Materials available as standard or reference samples are used for investigations in relation to uranium prospection, nuclear and isotopic measurements, reactor technology, safeguards, waste disposal and environmental pollution, including the marine environment, biomedical and agricultural isotope work and hydrology.

Plans for 1975-76

G. 36. The programme will be continued on the lines suggested by a panel of experts which met in 1973. New reference materials will be made available in the fields of safeguards applications, oceanic waste disposal and (stable) trace element measurements by nuclear techniques. Co-operation with other international, interregional and national organizations will be intensified to define demands, allocate responsibilities and avoid duplication of work.

Plans for 1977-80

G. 37. Samples distributed in intercomparisons in earlier years will become available as reference samples. This will enable laboratory staff responsible for the evaluation of the intercomparisons to concentrate their efforts on new materials.

Co-operation with other organizations

G. 38. Depending on the types of samples distributed, advice and co-operation is sought mainly from WMO, WHO, FAO, the International Bureau of Weights and Measures, ISO and IUPAC. Fruitful co-operation is also maintained with national standardization laboratories.

Agriculture

OBJECTIVE

G. 39. The objective is to assist the Joint FAO/IAEA Division by the provision of analytical and other services, particularly in support of co-ordinated research contract programmes.

RESULTS TO DATE

G.40. This sub-programme was initiated in 1962. With regard to soil fertility, analytical and development services - in support of the appropriate co-ordinated research programmes - have been provided for studies of the efficient use of fertilizers, particularly phosphorus and nitrogen, for rice, maize, wheat, tree crops and legumes. To help overcome some of the difficulties encountered in experimental work with trees, a new double tracer method involving the use of phosphorus-32 and phosphorus-33 has been developed.

G.41. Field and biochemical work was carried out to investigate the effect of nitrogen fertilization and symbiotic nitrogen fixation by grain legume crops with a view to the future development of a co-ordinated programme.

G.42. With regard to entomology, methods for the mass rearing of the Mediterranean fruit fly, olive fly and tsetse fly, have been or are being developed. The laboratory rearing of the tsetse fly on membranes, using animal blood as food, continues with success.

G.43. With regard to mutation plant breeding, emphasis has been placed on the production of wheat, barley and rice strains with a higher content of protein or with a better quality of protein. As such mutants are not necessarily morphologically different from the originals, a very great effort has been made to develop methods of routine analysis of total protein and of the amino-acid composition of such material. Since dye reacts strongly to basic amino acids, a dye-binding method was used which made it possible to develop a semi-automatic method of processing material; by using the latter method, about 60 000 samples can be handled per year.

G.44. Another method is being developed to enable the detection of protein mutants based on the ratios of certain amino acids in the protein. This method will make it possible to handle about 150 000 to 200 000 samples per year.

PLANS FOR 1975-80

G.45. Work on soil fertility, entomology and plant breeding will continue in accordance with the programme of the Joint IAEA/FAO Division.

Training

OBJECTIVE

G.46. The objective is to supply in-service training for fellows in subjects for which the Laboratory has the necessary equipment and expertise.

RESULTS TO DATE

G.47. This sub-programme was initiated in 1962. In-service training has been provided in chemistry, physics, entomology, plant breeding and soil-plant relationships and, in the past four years, 43 trainees have worked at the Laboratory.

G.48. In addition to in-service training, the Laboratory's staff has assisted in the running of external training courses by providing lecturers and technical advice. This assistance has been provided for regional training courses on radioisotope laboratory techniques, on radioisotope production, on nuclear electronics maintenance and on uranium ore analysis.

PLANS FOR 1975-80

G. 49. In-service training will continue to be provided in appropriate subjects. About 10-12 trainees per year are expected. Assistance for external training courses will be provided as required.

Electronics and workshop services

OBJECTIVE

G. 50. The objective is to provide electronics and workshop services to assist all Sections of the Agency as required.

RESULTS TO DATE

G. 51. This sub-programme was initiated in 1960. Maintenance has been provided for the electronic equipment and some, which is not commercially available, has been designed and built. The latter has recently included equipment providing interfaces between various computers and electronic equipment such as mass-spectrometers, multichannel analysers etc. Automatic equipment for counting and other systems, and also systems for high-resolution gamma spectroscopy electronics, have been developed. Approximately 70% of the work now being done by the Electronics Workshop is for the Department of Safeguards and Inspection and this includes the servicing and maintenance of portable equipment and the construction of the control system for surveillance apparatus. The Mechancial Workshop supplies the majority of the non-standard items for such apparatus.

PLANS FOR 1975-80

G. 52. Services will be supplied as required.

Safeguards analytical laboratory

OBJECTIVE

G. 53. The objective of this sub-programme is to provide services for the safeguards programme[G. 3]. The main activity involved is the participation, with laboratories in Member States, in an integrated programme for the analysis of samples taken during inspection.

RESULTS TO DATE

G. 54. This sub-programme will be initiated in 1975. As a programme component it was in previous years included under the Chemistry sub-programme of the laboratory[G. 4].

PLANS FOR 1975-76

G. 55. In 1975, a new laboratory, the safeguards analytical laboratory, will be established and equipped. The laboratory will have increased plutonium-handling facilities, which are very much lacking at present. As one of the principal tasks will be analytical control, several methods for each element must be available. Because the number of analyses will be large, particular attention will be paid to automated methods. Part of the control function of the laboratory will be to make intercomparison experiments with the national network of analytical laboratories.

PLANS FOR 1977-80

G. 56. Analytical and control work will continue on an increasing scale as the number of samples is expected to increase.

[G. 3] See paras M. 19, M. 27 and M. 30 below.

[G. 4] See para. G. 23 above.

H. INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table H.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	185 988	223 000	17 000	(20 000)	(3 000)	220 000	250 000
Consultants	13 728	16 000	800	-	800	16 800	17 000
Overtime	8 610	4 000	500	1 500	2 000	6 000	6 000
Temporary assistance	30 320	21 000	2 000	(3 000)	(1 000)	20 000	21 000
Sub-total	238 646	264 000	20 300	(21 500)	(1 200)	262 800	294 000
Common staff costs	45 042	69 600	7 600	(6 000)	1 600	71 200	80 500
Travel	4 366	5 000	400	(400)	-	5 000	5 000
Meetings							
Conferences, symposia, seminars	277 509	467 600	24 400	-	24 400	492 000	292 000
Technical committees, advisory groups	2 084	5 500	400	(400)	-	5 500	5 500
Representation and hospitality	4 323	4 000	500	-	500	4 500	5 000
Common services, supplies and equipment	184 234	154 400	15 600	-	15 600	170 000	190 000
Other items of expenditure							
Fellowships	31 982	40 000	3 000	(3 000)		40 000	30 000
Visiting scientists and lecturers	118 578	95 500	7 500	(13 000)	(5 500)	90 000	97 500
Associate members	69 950	66 400	3 600	34 000	37 600	104 000	80 500
Federated institutions	16 293	18 000	1 000	7 000	8 000	26 000	26 000
Sub-total	236 803	219 900	15 100	25 000	40 100	260 000	234 000
TOTAL	993 007	1 190 000	84 300 7.1%	(3 300) (0.3)%	81 000 6.8%	1 271 000	1 106 000
Source of funds:							
Regular Budget	160 000	181 000	17 000 9.4%	22 000 12.1%	39 000 21.5%	220 000	230 000
Operating Fund I	833 007	1 009 000	67 300	(25 300)	42 000	1 051 000	876 000
TOTAL	993 007	1 190 000	84 300 7.1%	(3 300) (0.3)%	81 000 6.8%	1 271 000	1 106 000

SUMMARY OF MANPOWER

Table H.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
P-5	1	1	1	-	1	1
P-4	1	1	1	-	1	1
P-3	1	3	3	-	3	3
P-2	1	-	-	-	-	-
Sub-total	4	5	5	-	5	5
GS	15	17	17	-	17	17
M&O	-	-	-	-	-	-
TOTAL	19	22	22	-	22	22

CHANGES IN COSTS

H.1. For 1975 the contributions of the Agency and UNESCO will each be increased from $181 000 to $220 000. A further increase in each contribution to $230 000 is planned for 1976.

H.2. As will be seen from Table H.1 above, the total cost of this programme is expected to increase by $81 000 as a net result of price increases of $84 300, partly offset by a programme reduction of $3300.

H.3. Owing to the increased work load it will be necessary to recruit two GS staff members; since, however, the staff costs involved will be charged against existing Professional posts, there will be a programme reduction of $26 000 under Salaries and wages. A small increase in expenditure on overtime is expected to be more than offset by a reduction in temporary assistance costs.

H.4. In summary, it is assumed that the activities of the Centre will be financed in 1975 from the following sources of funds:

Regular Budget			220 000
Operational Budget			
Italian Government		350 000	
UNESCO		220 000	
SIDA		191 500	
UNDP: Solid state physics	80 000		
Mathematics	100 000		
Oceanography	100 000		
		280 000	
Other		9 500	
			1 051 000
			1 271 000

Summary of cost by activity and major source of funds

Table H. 3

Scientific and administrative expenditures in 1975	Trieste Centre Funds	SIDA Funds	UNDP Funds	Total
Scientific staff and activities				
Scientific staff	75 000	-	-	75 000
Fellowships	40 000	-	-	40 000
Scientific visitors	90 000	-	-	90 000
Consultants	16 800	-	-	16 800
Other scientific activities				
Associates	45 500	53 500	-	99 000
Junior associates	5 000	-	-	5 000
Federated institutions	26 000	-	-	26 000
Seminars and workshops				
Solid state workshop	-	-	80 000	80 000
Nuclear physics				
Winter college	30 000	38 000	-	68 000
Workshop	20 000	-	-	20 000
Oceanography	-	-	100 000	100 000
Mathematics	-	-	100 000	100 000
Science teaching	15 000	100 000	-	115 000
Astrophysics and relativity	6 000	-	-	6 000
Biophysics	3 000	-	-	3 000
Other scientific and technical experts				
Scientific Council	5 500	-	-	5 500
Publications	5 000	-	-	5 000
Library	31 000	-	-	31 000
Duty travel	5 000	-	-	5 000
Scientific administration	163 000	-	-	163 000
Administration and overheads	217 700	-	-	217 700
TOTAL	799 500	191 500	280 000	1 271 000

THE PROGRAMME

OBJECTIVE

H. 5. The objective is to foster, through research and training, the advancement of theoretical physics with special regard to the needs of developing countries so as to encourage theoretical physicists from those countries to continue and expand their research work.

CO-OPERATION WITH OTHER ORGANIZATIONS

H. 6. The Centre is operated jointly by the Agency and UNESCO and is supported by the Italian Government; SIDA also participates in its financing. UNDP finances projects in applied mathematics and computer science, with UNESCO as executing agency, and in solid state physics, with UNESCO and the Agency as executing agencies.

STRUCTURE

H. 7. This programme consists of seven sub-programmes, which are dealt with separately below.

SUB-PROGRAMMES

Condensed matter physics

OBJECTIVE

H. 8. The objective is to foster training and research in condensed matter physics in developing countries in the light of its relevance to scientific, industrial and technological development.

RESULTS TO DATE

H. 9. This sub-programme was initiated in 1967. Extended courses [H.1] were held in 1967, 1970 and 1972 and workshops [H.2] lasting three to four months were organized in 1970, 1971, 1972 and 1973. To date, about 460 scientists have participated in these activities. Approximately 100 preprints and the proceedings of the extended courses have been published.

PLANS FOR 1975-76

H. 10. It is planned to organize a "Solid State Workshop" in 1975 and a "Solid State Winter College" followed by a workshop in 1976.

PLANS FOR 1977-80

H. 11. It is planned to organize further workshops in condensed matter physics in 1977 and 1979 and an extended course followed by a workshop in each of the years 1978 and 1980.

High-energy and particle physics

OBJECTIVE

H. 12. The objective is to provide a forum for international collaboration in the most advanced fields of research in fundamental theoretical physics at the highest possible level and to enable university teachers from developing countries to attend the Centre, bring their knowledge up to date and exchange ideas concerning their research work.

RESULTS TO DATE

H. 13. This sub-programme was initiated in 1964. One extended seminar was held in 1965, while part of the Symposium on Contemporary Physics also covered high-energy and particle physics. Two topical meetings were held in 1969, two in 1970, two in 1971 and

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[H.1] An "extended course" (sometimes called a "Winter College" or "Summer College") is a theoretical course lasting about three months and dealing with a fairly broad subject. In the selection of participants, preference is given to persons with relevant research experience. As a rule, financial support is provided for participants from developing countries.

[H.2] A "workshop" is usually devoted to the study of specific problems connected with the subject of an extended course.

one in 1973. Research in high-energy physics has been carried out at the Centre since its establishment. About 1350 physicists have participated in this part of the programme as visiting or guest scientists, associate members, fellows, guest lecturers and seminar participants. Approximately 670 preprints and the proceedings of the seminar held in 1965 have been published.

PLANS FOR 1975-76

H. 14. Research will continue throughout 1975 and 1976, and one or more topical meetings relating to current developments will be held if the need arises.

PLANS FOR 1977-80

H. 15. Research will continue throughout this period.

Nuclear physics

OBJECTIVE

H. 16. The objective is to foster research, and training for research, in theoretical nuclear physics with particular regard to the needs of developing countries.

RESULTS TO DATE

H. 17. This sub-programme was initiated in 1964 with a small research group and continued in 1965. Extended courses were organized in 1966, 1969, 1971 and 1973. A larger research group was active from 1966 to 1968. Workshops were organized in 1969 and 1971. In the years when there was no formal programme of work in nuclear physics, some research was carried out by associate members, independently or in collaboration with scientific staff of the University of Trieste. Some 650 scientists have participated in these activities. Proceedings of the extended courses have been published.

PLANS FOR 1975-76

H. 18. A "Nuclear Physics Winter College" and a "Nuclear Physics Workshop" will be organized in 1975.

PLANS FOR 1977-80

H. 19. It is planned to organize a workshop in 1977 and an extended course or a workshop in 1979.

Plasma physics

OBJECTIVE

H. 20. The objective is to provide a forum for high-level international collaboration in the light of the scientific interest of the subject and its potential contribution to the generation of energy by thermonuclear fusion.

RESULTS TO DATE

H. 21. This sub-programme was initiated in 1964 and an extended course was held in that year. A small working party worked at the Centre throughout the period 1964-65, and its membership was increased in 1965-66. Research sessions were organized in 1970 and 1973. Approximately 210 scientists have participated in these research activities. About 60 preprints and the proceedings of the extended course held in 1964 have been published. Excellent collaboration between American, Soviet and European plasma physicists has characterized the research sessions.

PLANS FOR 1975-76

H. 22. Meetings will be organized if justified by scientific developments.

PLANS FOR 1977-80

H. 23. Research workshops will be organized in 1977 and 1979.

Atomic, molecular and laser physics

OBJECTIVE

H. 24. The objective is to provide an international scientific forum for exchanging ideas and carrying out research in atomic and molecular physics and in quantum optics and laser physics.

RESULTS TO DATE

H. 25. In 1973 the Centre for the first time organized a three-month "Winter College" on atoms, molecules and lasers; it was attended by 99 lecturers and participants.

PLANS FOR 1975-76

H. 26. A workshop on lasers and non-linear optics will be held in 1975 if funds are available and a workshop on group theoretical methods in atomic, molecular and solid state physics is planned for 1976.

PLANS FOR 1977-80

H. 27. An extended course will be organized in 1977. Workshops are planned for 1978 and 1980.

Astrophysics and relativity

OBJECTIVE

H. 28. The objective is to organize workshops where leading and junior astrophysicists and scientists working in the field of relativity theory can discuss the most recent developments.

RESULTS TO DATE

H. 29. Many astrophysicists have already visited the Centre, during the Symposium on Contemporary Physics, which was held in 1968 and at which 13 survey papers by leading scientists were presented. Conferences - on Late-type Stars (1965), Mass Loss from Stars (1968) and Supergiant Stars (1971) - organized by the University of Trieste and held on the Centre's premises have given physicists present at the Centre at the time a chance to familiarize themselves with the problems of astrophysics; about 300 physicists attended these conferences. A research session on astrophysics and relativity was organized in July-August 1973, with 63 scientists taking part and 13 preprints being published.

PLANS FOR 1975-76 AND 1977-80

H. 30. It is planned to organize summer research sessions, possibly every year. The size of the research groups will depend on the availability of resources.

Biophysics

OBJECTIVE

H. 31. The objective is to bring the specialized knowledge and skills of physicists, mathematicians and biologists to bear on particular problems.

RESULTS TO DATE

H. 32. A small part of the Symposium on Contemporary Physics was devoted to biophysics. In 1972, during the Summer College on Global Analysis and its Applications, a small group of physicists, biologists and physicians met for three days to discuss neural networks. A summer school on the physics and mathematics of the nervous system, sponsored partly by the Volkswagen Foundation and attended by 89 scientists, was held in August 1973.

PLANS FOR 1975-76

H. 33. Small meetings will be held in 1975 and 1976.

PLANS FOR 1977-80

H. 34. It is planned to hold at least two courses or research workshops.

NON-AGENCY ACTIVITIES

H. 35. During the period 1975-76, projects financed by UNDP and with UNESCO as executing agency will be carried out at the Centre: an extended course on the physics of oceans and the atmosphere (held with the assistance of WMO) and one on complex analysis and its applications in physics will take place in 1975; it is planned to organize an extended

course on functional analysis and its applications in 1976. Depending on the availability of UNDP financial support, it is planned to organize an extended course on applied mathematics or computer science every year during the period 1977-80.

H. 36. Other non-Agency activities will include courses on science teaching in 1975 and 1978, again depending on science curricula and the availability of funds. These courses will emphasize modern teaching methods (such as the use of audio-visual media, programmed lectures and personalized systems of instruction).

I. NUCLEAR POWER AND REACTORS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table I.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	508 932	600 000	77 000	118 800	195 800	795 800	909 800
Consultants	34 326	12 000	800	46 400	47 200	59 200	79 000
Overtime	84	500	100	-	100	600	700
Temporary assistance	87	1 400	200	100	300	1 700	2 000
Sub-total	543 429	613 900	78 100	165 300	243 400	857 300	991 500
Common staff costs	166 253	193 000	26 500	38 300	64 800	257 800	293 700
Travel	18 781	36 600	1 900	5 000	6 900	43 500	50 000
Meetings							
Conferences, symposia, seminars	57 405	105 000	7 000	(34 000)	(27 000)	78 000	120 000
Technical committees, advisory groups	56 016	53 000	4 000	74 500	78 500	131 500	140 000
Representation and hospitality	3 232	4 500	500	1 900	2 400	6 900	7 000
Scientific and technical contracts	54 965	87 000	4 000	7 000	11 000	98 000	98 000
Scientific supplies and equipment	935	-	-	500	500	500	500
Common services, supplies and equipment	889	-	-	2 500	2 500	2 500	2 500
Other items of expenditure							
Linguistic services	67 616	72 000	9 000	-	9 000	81 000	89 000
Printing and publishing services	172 431	46 000	4 000	121 000	125 000	171 000	259 800
TOTAL	1 141 952	1 211 000	135 000 11 1%	382 000 31.5%	517 000 42.6%	1 728 000	2 052 000
Data processing services	72 689	44 000	3 000	2 000	5 000	49 000	55 000

SUMMARY OF MANPOWER

Table I.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	11	11	11	-	11	11
P-4	6	6	6	6	12	12
P-3	3	3	3	-	3	3
P-2	2	2	2	-	2	2
Sub-total	23	23	23	6	29	29
GS	14	14	14	-	14	14
M&O	-	-	-	-	-	-
TOTAL	37	37	37	6	43	43

CHANGES IN COSTS AND MANPOWER

Costs

I.1. It is expected that the cost of this programme will increase in 1975 by $517 000, of which $135 000 will be required to cover salary and other price increases and $382 000 will be a programme increase.

I.2. Most of the programme increase is attributable to a provision for six additional Professional posts (entailing additional emoluments estimated - with allowance for some delays in recruitment - at $157 100), to the need for additional consultants' services (entailing additional expenditures estimated at $46 400), to the holding of additional meetings (entailing net additional expenditures estimated at $40 500) and to an increase in the number of publications (proceedings of scientific meetings, codes and manuals - costing an additional amount estimated at $121 000).

Manpower

I.3. As will be seen from Table I.2 above, six additional Professional posts at the P-4 level are foreseen for 1975:

(a) One post for an energy economist for the "Energy forecasts and power economics" sub-programme (see para. I.20 below);

(b) Two posts for the "Nuclear materials resources, supply and demand" sub-programme, one for an economic geologist for the "Uranium and thorium resources, production and demand" component (see para. I.31 below) and one for the "Uranium exploration, development and ore processing" component (see para. I.43 below);

(c) One post for the "Fuel technology" sub-programme (see para. I.60 below); and

(d) Two posts for the "Assistance in nuclear power planning" sub-programme (see para. I.81 below).

THE PROGRAMME

OBJECTIVE

I.4. The objective is to provide integrated assistance to Member States in the planning and implementation of nuclear power programmes for electricity generation and other purposes by:

(a) Assisting them directly through the technical and economic assessment of programmes, the execution of reactor projects and the supply of nuclear materials;

(b) Collecting and disseminating evaluated and systematized information on nuclear power programme requirements and on proven and newer nuclear technologies; and

(c) Assessing the future role of nuclear power in meeting world energy demands within the constraints imposed by environmental factors and the availability of financial resources.

RESULTS TO DATE

I.5. During the early stages of the programme, which was initiated in 1959, the general status of nuclear power plants and nuclear fuel resources became clearer. The Division of Nuclear Power and Reactors has acquired a considerable ability to assist Member States, particularly on the basis of experience gained through activities such as the following:

(a) The establishment of a general picture of uranium demand and supply through periodic reports;

(b) The provision of advice on prospecting for and evaluating uranium deposits to over 30 countries (including Greece and Pakistan, within the framework of large-scale UNDP projects);

(c) The provision of technical assistance in fields such as uranium mining, ore processing and fuel fabrication (including assistance with the UNDP project initiated in Romania in 1973);

(d) The conduct, on the basis of a comprehensive methodology, of a market survey of the potential demand for nuclear power in 14 developing countries (completed in 1973);

(e) The execution of a UNDP-financed feasibility study for a nuclear power station in the Philippines (the study has culminated in a decision by the Philippine authorities to construct the country's first nuclear power station);

(f) The provision of advice on nuclear power planning to several countries through advisory missions;

(g) The preparation of guide-books for countries embarking on nuclear power programmes (further guide-books of this kind are being prepared); and

(h) The conduct of annual reviews of power reactor operating experience.

I.6. The methodology developed for the nuclear power market survey has proved valuable and will be refined steadily for use in nuclear power planning studies to advise Member States on their nuclear power programmes. The possibilities of enabling present and potential users of nuclear power to derive maximum benefit from Agency symposia and other meetings were studied in 1973 within the context of the commercialization of nuclear power. The activities of international working groups [I.1] are being reviewed this year in the light of the expected considerable increase in the use of nuclear power and the attendant problems of nuclear power plant reliability and safety (for this reason the working groups do not appear as separate sub-programme components).

I.7. In late 1973 and early 1974, international oil prices underwent a major, almost stepwise increase, and the competitive position of nuclear energy changed drastically within a very short time. In the industrialized countries, nuclear power programmes are now being revised with a view to installing higher nuclear electricity generating capacities in shorter times than previously foreseen. There is also an increase in interest in other applications of nuclear energy - for example, district heating from dual-purpose stations. It is at present difficult to keep abreast of the rapidly changing forecasts of developments, even those concerning the immediate future.

[I.1] International Working Group on Nuclear Power Plant Control and Instrumentation; International Working Group on Reactor Radiation Measurements; International Working Group on Pressure Vessels; International Working Group on Non-Destructive Testing; International Working Group on Fast Reactors.

I.8. Similarly, the situation has changed substantially in the developing countries, and this will lead many such countries - in addition to the ten which now have nuclear power stations in operation or under construction - to embark on nuclear power programmes earlier than previously expected. Taking the results of the nuclear power market survey [I.2] as a basis and extrapolating them roughly to include all developing countries, and also taking into account "foreseeable" oil prices, it may now be assumed that up to 20 additional countries could on economic grounds have nuclear power stations of more than 500-600 MW(e) capacity in operation by 1990, which means that these countries would have to decide to initiate nuclear power programmes within the next five years. If small or medium-power reactors - in the range 100-400 MW(e) - were available, the number of countries initiating such programmes could be considerably higher. A number of serious problems would have to be faced immediately by all these countries, namely capital investment financing, questions of availability of qualified staff who fully understand the particular requirements for a nuclear power project, and the necessity for standards, codes, control procedures and techniques, which are usually developed step by step from experience. It is accordingly to be expected that a large number of countries, in order to avoid costly mistakes and delays, will now turn to the Agency not only for advice and assistance on technical and administrative problems with their first nuclear power projects, but also for guidance in regulatory matters.

PLANS FOR 1975-80

I.9. While the nuclear power market survey gave a clear indication that some five additional developing countries could be expected to take the decision to initiate nuclear power programmes, the present situation will prompt many more developing countries to do so and the industrialized countries to accelerate their existing nuclear power installation programmes. This will reduce the time available to the Agency for preparatory work and will make necessary the provision within the next few years already of advice and assistance to developing countries at a level which was originally foreseen for the mid-1980s. The urgency of the situation is indicated by the ten requests for advice in connection with nuclear power planning studies which were received during the first three months of 1974.

I.10. The requests for advice and assistance must now be expected to increase to such a level that it will become essential to develop a more systematic approach to meeting them; this will necessitate easy access to information for planning purposes, standardized methodologies and procedures and more carefully planned use of the resources available.

I.11. Another major demand will be for training, through courses and seminars, in all activities related to nuclear power projects, including nuclear power economics, optimization of fuel cycle services and the technological problems associated with the initiation of domestic fuel fabrication.

I.12. Within this context, and taking into consideration the concern expressed by Member States regarding the safety and reliability of nuclear power plants, a sub-programme entitled "Nuclear power plant technology and reliability" has been established to provide Member States with co-ordinated advice and assistance in all questions regarding nuclear power plant reliability and quality assurance.

I.13. The changes in the world energy situation have made the conference envisaged for 1976 on the future role of nuclear power in meeting world energy demands, current commercial reactor systems, second-generation nuclear power systems and advanced nuclear technology all the more timely. With regard to the latter two subjects, efforts to obtain an international exchange of information will continue, the technological aspects being stressed.

[I.2] For details, see document GC(XVII)/506.

RELATED ACTIVITIES

I.14. The related activities include the award of research contracts and the conclusion of research agreements in appropriate fields. In particular, the co-ordinated research programmes already established will continue, but in the 1975-80 programme period new subjects such as studies on waste heat utilization, process heat and the processing of low-grade uranium ores will be introduced in response to the growing interest of Member States. The training of scientists, engineers and technicians in the various aspects of nuclear power will continue to be an important feature of the programme of the Division of Nuclear Power and Reactors, which will include regional training courses - mainly on nuclear project implementation. In addition it is foreseen that the Division will contribute more to the training activities of the Division of Technical Assistance.

CO-OPERATION WITH OTHER ORGANIZATIONS

I.15. The programme involves co-operation with the United Nations and its regional commissions, IBRD, UNIDO, UNDP, UNEP, OECD(NEA), EURATOM, UNIPEDE, ISO, IIASA and other organizations.

STRUCTURE

I.16. This programme consists of six sub-programmes, which are dealt with separately below. The "Research Reactors" sub-programme will be transferred in 1975 to the Division of Research and Laboratories, in the programme of which it figures as a sub-programme component entitled "Utilization of research reactors".

Summary of manpower and costs

Table I.3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Energy forecasts and power economics	4.7	2.5	246 500	4.7	2.5	340 900
Nuclear materials recources, supply and demand	5.6	3.6	337 400	5.6	3.6	322 500
Fuel technology	3.6	1.6	194 900	3.6	1.6	262 500
Nuclear power project implementation	6.6	2.4	355 700	6.6	2.4	413 700
Nuclear power plant technology and reliability	5.4	2.5	334 700	5.4	2.5	451 200
Reactor physics and advanced nuclear power technology	3.1	1.4	258 800	3.1	1.4	261 200
TOTAL	29.0	14.0	1 728 000	29.0	14.0	2 052 000

SUB-PROGRAMMES

Energy forecasts and power economics

OBJECTIVE

I.17. The objective is to prepare and keep up-to-date long-term forecasts of supply and demand with regard to primary energy, electric power and nuclear power on a

national, regional and world basis, to estimate present and future investment and fuel costs for nuclear and conventional energy sources, to carry out economic comparisons on the basis of a consistent methodology in order to maintain an up-to-date picture of the present and future competitive status of nuclear energy, and to study the possible means of financing alternative energy programmes, thereby providing the background information and other data essential in assisting Member States with nuclear power planning and the assessment of the future role of nuclear energy.

RESULTS TO DATE

I.18. This sub-programme combines the former "Energy Forecasts" and "Economic Evaluation of Conventional and Nuclear Power" sub-programmes. Nuclear power growth and the consequent expected demand for natural uranium and for enrichment services under varying assumptions as to the relative role to be played by different reactor types were the subject of special studies published under the joint sponsorship of OECD(NEA) and the Agency in 1970 and 1973. A study group on the impact of different reactor strategies on world long-term energy supplies was convened in 1973. The results of surveys relating to these topics were presented in publications and at a training course held in Bangkok in 1973. A special effort was directed to establishing the methodology underlying the 1973 nuclear power market survey and the reference capital and fuel costs for nuclear and conventional power stations in the supplying countries and to extrapolating these costs to conditions prevailing in developing countries. In order to improve and adapt the existing procedures, a panel on the methodology of electricity systems expansion planning was held in October 1973 and one on cost extrapolation from supplying to developing countries is planned for 1974. The results are being made available to developing countries through general reports, training courses and direct utilization of the computer programmes developed in the course of these activities.

PLANS FOR 1975-76

I.19. The recent drastic changes in fossil fuel costs have considerably improved the competitive position of nuclear energy and made evident the necessity of reassessing nuclear power programmes within the context of a rapidly changing world energy situation which must be kept under continuous review. A great deal of new information is becoming available through various international and national organizations, and it is essential for the Agency in assessing the role of nuclear power to avail itself fully of this information through the establishment of systematic procedures for its collection, evaluation, processing, storage and retrieval. This will involve:

(a) The collection of information on the general energy demands and supply and on the general economic development of each Member State, including all the information available within the United Nations system, to serve as a basis for reviewing primary energy and electric power projections and preparing up-to-date analyses of the nuclear power market in developing countries;

(b) Analyses of nuclear fuel demand and supply - to show the requirements for nuclear fuel cycle services on a national, regional and global basis - and periodic surveys relating to uranium exploration, uranium resources, uranium prices and international supply contracts (including contracts for the provision of enrichment, reprocessing and other fuel cycle services); and

(c) Periodic analyses of the status of technology and the costs of conventional energy sources - especially fossil fuels, which will serve as a basic reference.

The body of data thus assembled and continuously up-dated will be made available to Member States in periodic publications and will serve as input for continuing the nuclear power market survey and individual project analyses. It will also help the Agency's staff to deal with the great number of requests for general information which are being received from other organizations and from Member States.

I.20. The speedy fulfilment of this task will require the provision of an additional P-4 post for an energy economist in 1975, the use of consultants and the holding of at least one advisory group meeting each year from 1975 onwards. In addition, the Agency will participate in a meeting of the OECD(NEA) Study Group on the Long-Term Role of Nuclear Energy expected to be held in 1975 to consider the impact of revised nuclear programmes on the future demand for uranium separative work and on other components of the nuclear fuel cycle.

I.21. The establishment of this comprehensive body of data and projections will be accompanied by a systematic improvement of the methodologies required for its application to practical situations in individual Member States. In accordance with a recommendation made in 1973 by a panel on the methodology of electricity systems expansion planning, an advisory group will be convened in 1975 to improve the methods used for electric load forecasting in nuclear power planning studies through the introduction of probabilistic and sectorial analysis. In 1976 an advisory group on improved modelling of electric systems with large nuclear and hydroelectric components will be convened. The need to take environmental factors into account when preparing comprehensive power programmes entails the application of new methods of economic appraisal and comparison. A survey of such methods and of their relevance to practical cases will be undertaken by consultants in 1975.

I.22. The problem of financing lies at the heart of nuclear power planning in developing countries. Accordingly, an advisory group on sources and methods of financing nuclear power projects in developing countries will be held in 1976. The methodology for nuclear power project cost evaluation will be continually up-dated through advisory group meetings and the use of consultants.

PLANS FOR 1977-80

I.23. Evaluations and analyses have to be continuing processes in order to take into account rapid technological changes and the discovery of new resources for conventional and nuclear power generation. Periodic reports on these subjects will be prepared by Agency staff in collaboration with advisory groups and made available to Member States.

I.24. In the planning of meetings and training courses, special attention will be paid to the costs and the fuel infrastructure of advanced reactor types. The economic implications for developing countries of embarking on major nuclear power programmes will require careful study with a view to ascertaining the possibilities of national and international financing. Assistance to developing countries in various phases of the economic planning of their nuclear power programmes is expected to expand substantially.

CO-OPERATION WITH OTHER ORGANIZATIONS

I.25. The programme involves co-operation not only with the United Nations and its regional economic commissions but also with OECD(NEA), IBRD, UNEP and IIASA.

Energy forecasts and power economics

Table I.4

	Man-years		1975 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Energy forecasts and power economics	4.7	2.5	190 300	30 000	-	6 200	226 500
Linguistic, printing and publishing services	-	-	-	-	-	20 000	20 000
TOTAL	4.7	2.5	190 300	30 000	-	26 200	246 500

Nuclear materials resources, supply and demand

OBJECTIVE

I.26. Until late 1973 the uranium demand and supply situation was satisfactory, although the long-term predictions of uranium demand were not meeting with an appropriate response in terms of increasing exploration activity. The recent energy crisis, however, has brought about a dramatic change in the situation, with forward contract prices for uranium increasing considerably in early 1974. This will lead to a considerable increase in exploration activity in all parts of the world, and especially in developing countries, at a much earlier date than previously anticipated. The Agency can expect to be faced with increasing requests for advice on nuclear materials resources, geology, exploration methods, production and ore processing and for the provision of technical assistance to developing countries in all these areas.

The objective of the sub-programme is to:

(a) Provide Member States with guidance and information on the development of uranium and thorium resources, production capabilities and demand;

(b) Assist developing countries with their uranium exploration, development and ore-processing programmes; and

(c) Provide heavy water and fuel supply services.

STRUCTURE

1.27. This sub-programme, which was previously entitled "Uranium Resources", consists of the three components described in the following paragraphs.

Nuclear materials recources, supply and demand

Summary by programme components

Table I.5

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Uranium and thorium resources, production and demand	2.6	1.5	98 800	21 000	-	1 600	121 400
Uranium exploration, development and ore processing	2.0	1.0	69 500	10 000	35 000	3 500	118 000
Nuclear materials supply	1.0	1.1	45 000	-	-	-	45 000
Linguistic, printing and publishing services	-	-	-	-	-	53 000	53 000
TOTAL	5.6	3.6	213 300	31 000	35 000	58 100	337 400

Uranium and thorium resources, production and demand

Objective

I.28. The objective is to maintain an up-to-date picture of the world's uranium and thorium resources, production and demand in the light of reactor strategies and provide basic reference data for the guidance of Member States in their exploration, development and ore-processing programmes.

Results to date

I.29. This component was initiated in 1967. The most recent report of the OECD(NEA)/IAEA Joint Working Party, issued in August 1973 and based on certain assumptions regarding reactor strategies, gives a comprehensive picture of world nuclear raw materials resources, demand and production.

Plans for 1975-76

I.30. The OECD(NEA)/IAEA Joint Working Party's reports on uranium resources, demand and production will be used as basic documents for the future orientation of this sub-programme component and will be up-dated in the light of technical and economic trends at two technical committee meetings to be held in 1975. The growing role of nuclear energy is likely to result in a very considerable increase in uranium exploration activities in all parts of the world, including developing countries, at a much earlier date than previously foreseen. The Agency's ability to give advice and support to all Member States will depend on the availability of adequate Headquarters staff. It will be necessary to establish procedures for maintaining systematized information on resources, production capacities, costs, prices and supply contracts.

I.31. One economic geologist specializing in uranium resources will be required to deal with resources, costs and projections of the availability of uranium. This staff member, to be recruited at the P-4 level, will be responsible for keeping Member States fully informed about all aspects of these subjects and about such associated subjects as the effects of radiological and waste management legislation controls on uranium costs and ore reserves and national legislation concerning uranium exploration and exports. An advisory group meeting on methods of evaluating favourable uranium regions will be held in 1975 and a survey of uranium costs, prices and contracts will be discussed in a consultants' meeting.

Plans for 1977-80

I.32. The OECD(NEA)/IAEA Joint Working Party will continue to review uranium resources, production and demand at two-year intervals. An advisory group on reactor strategies will be convened when required.

I.33. It is foreseen that there will be an increasing need for uranium exploration and development, reflected in a larger number of meetings and in greater support to research activities.

Related activities

I.34. Following the advisory group meeting on uranium geology in 1970 a symposium on the formation of uranium ore deposits is being held in 1974. Technical committee meetings on uranium geology are scheduled for 1976.

I.35. It is proposed to follow up an advisory group meeting on uranium exploration methods held in 1972 with a symposium on uranium exploration to be held in 1976. In addition, a consultants' meeting on uranium prospecting instrument calibration will be held in 1975 and an advisory group meeting on uranium prospecting instrumentation is planned for 1976.

I.36. In connection with the study of uranium resources and costs, a meeting on "Radon in Uranium Mining: The Effect of Protective Controls on Uranium Reserves and Costs; Ventilation Problems; Basic Research" was held in 1973.

Co-operation with other organizations

I.37. This component involves co-operation with OECD(NEA), the geological departments of national atomic energy agencies, national and international geological and mining

associations and the International Geological Correlation Programme sponsored by UNESCO.

Uranium exploration, development and ore processing

Objective

I.38. The objective is to give developing Member States advice and assistance in the exploration, development and economic exploitation of their indigenous nuclear raw materials reserves. The results of the activities comprising the sub-programme component entitled "Uranium and thorium resources, production and demand" will help to provide basic information for this sub-programme component.

Results to date

I.39. As part of the Agency's technical assistance programme, the technical assessment and administration of large-scale UNDP projects in Greece and Pakistan were undertaken in 1971. These projects, which entered their second phase in 1974, will continue until 1976. A similar large-scale UNDP project - planned to continue until the end of 1976 - was initiated in Turkey in 1974 and will likewise require technical assessment and administration. A further, similar request relating to a large-scale exploration project has been received and others are expected.

I.40. Small-scale Agency-supervised projects in over 15 countries are being financed either by UNDP or from Agency technical assistance funds; an increase in the number of such projects is to be foreseen. In 1974, uranium exploration and development account for 9.3% of the Agency's total expenditure on technical assistance projects.

I.41. Arrangements have been made to hold a UNDP-financed training course on uranium exploration and evaluation in India in November-December 1974 for the countries of the South East Asia area.

Plans for 1975-76

I.42. The large-scale UNDP projects referred to above will continue and it is anticipated that a number of large-scale and small-scale projects will be requested and initiated during this period. Two UNDP-financed training courses for participants from Europe, the Middle East and Africa - one on geochemical prospecting and the other on general uranium exploration and evaluation - will be held in 1975 and 1976 respectively. An advisory group meeting on uranium ore processing will be held in 1975.

I.43. The present staff is already too small to meet current demands regarding the technical assessment and administration of technical assistance projects. One additional staff member at the P-4 level will be required as from 1975 to help in providing technical assistance and advisory services.

Plans for 1977-80

I.44. It is foreseen that there will be an increasing need for uranium exploration and development, reflected in a larger number of technical assistance requests and programmes.

Related activities

I.45. In the field of uranium ore processing, participants from nine countries are involved in a co-ordinated research programme on the bacterial leaching of uranium ores. A co-ordinated research programme concerned with the in situ leaching of uranium was initiated in 1974. Contracts for research connected with uranium exploration and the processing of uranium ores will be awarded in 1974 or 1975.

Co-operation with other organizations

I.46. This component involves co-operation with the United Nations, UNDP, the geological departments of national atomic energy organizations, and national geological and mining associations and departments.

Nuclear materials supply

Objective

I.47. The objective is to respond to requests from developing countries for advice on economically available resources of reactor fuel and heavy water, to assist them at each step in the contracting procedures and to study the feasibility of a stock-pile of nuclear materials for their benefit.

I.48. This is a new component the need for which is evident in view of the expected increase in demands, especially from developing countries, for Agency services in connection with the supply of reactor fuel and heavy water. While the majority of such developing countries are dependent on industrialized countries for nuclear materials, in particular enriched uranium and heavy water, one of the Agency's functions is to assist developing countries in obtaining economic and guaranteed supplies of such materials in assured quantities. The activities relating to this component will be undertaken jointly with the Legal Division.

Results to date

I.49. This component will include activities previously in the "Supply of Special Nuclear Materials" sub-programme, under which nuclear materials in small amounts have been supplied in response to 151 requests from 36 Member States. Assistance to Mexico in the procurement of enriched uranium for a power reactor has already been initiated at the request of that country.

Plans for 1975-76

I.50. An increasing number of requests can be expected for Agency services in connection with the supply of power reactor fuel and heavy water; Member States will be offered continuous support covering each step in the contracting procedures. In addition, reviews of world enriched uranium and heavy water production capabilities and of the economic and legal aspects of supply contracts will be undertaken.

Plans for 1977-80

I.51. Besides responding to requests in connection with the supply of nuclear materials, the Secretariat will continue to up-date its estimates of the demand for reactor fuel and heavy water arising from the nuclear power programmes in developing countries.

Related activities

I.52. The work, which is of a continuing nature, may involve surveys and the evaluation of available information on uranium (natural and enriched), heavy water and other nuclear materials.

Co-operation with other organizations

I.53. This component involves co-operation with OECD(NEA), EURATOM and governmental, intergovernmental and private suppliers.

Fuel technology

OBJECTIVE

I.54. The objective is to disseminate information on scientific, technological and economic aspects of nuclear fuel, to assist Member States in obtaining the fuel element fabrication services they require and - by fostering an exchange of information on fuel fabrication, reprocessing and recycling technology between all countries - to assist developing countries in establishing their own fuel cycle technology.

STRUCTURE

I.55. This sub-programme consists of two components, which are described in the following paragraphs.

Fuel technology

Summary by programme components

Table I.6

Programme component	Man-years P	Man-years GS	1975 Cost estimates				
			Staff	Meetings	Contracts	Other	Total
Fuel element technology	2.6	0.9	84 700	10 000	-	1 800	96 500
Fuel reprocessing and recycling	1.0	0.7	41 200	10 000	-	2 200	53 400
Linguistic, printing and publishing services	-	-	-	-	-	45 000	45 000
TOTAL	3.6	1.6	125 900	20 000	-	49 000	194 900

Fuel element technology

Objective

I.56. The objective is to facilitate an international exchange of information on fuel element technology, research and development with a view to giving Member States, especially developing countries, advice and assistance in connection with the establishment of local fuel element fabrication.

Results to date

I.57. The main economic and technical features of fuel element technology were reviewed in 1972 by a study group on the facilities and technology needed for nuclear fuel fabrication. With the industrial emergence of fast breeders and high-temperature reactors, a symposium on fuel and fuel elements for fast breeder reactors and a panel on sol-gel processes for fuel fabrication were held in 1973. The performance of fuel elements in commercial power reactors has been reviewed.

I.58. Requests from Argentina, Brazil and Mexico for advice on fuel element fabrication have been met and assistance has been given in connection with the UNDP project in Romania.

I.59. Concern regarding fuel element behaviour during reactor operation and the need for a more thorough technical and economic evaluation of methods of quality control in nuclear fuel fabrication have prompted the holding of an advisory group meeting on these questions in 1974.

Plans for 1975-76

I.60. In line with the objective set forth above, the activities to be undertaken as a matter of urgency are the collection and dissemination of information which will lead to an understanding of the difficult technology involved in the fabrication and quality assurance of nuclear fuel elements. The number of requests for assistance has increased markedly over the past five years, and in the light of the growing need for nuclear power it must be expected that an even greater demand will arise. Efforts must therefore be intensified so as to speed up the formulation of standard technical specifications and codes and the publishing of manuals on quality assurance in fuel fabrication. For this purpose one additional P-4 post as of the second half of 1975 and the services of consultants for about two man-months per year in 1975 and 1976 will be required. An advisory group meeting on fuel fabrication will be held in 1975 and a seminar on fuel element quality control in 1976.

I.61. In addition, activities relating to subjects of general interest such as fuel enrichment techniques, fuel element performance and the thermodynamics of nuclear materials will be continued, the aim being to assemble information of use to Member States. An advisory group meeting on the fuel cycle will be held both in 1975 and in 1976 to consider topics relating to the optimization of fuel cycle processes and services; in addition, the holding in 1976 of an advisory group meeting on advanced fuel enrichment techniques is being tentatively considered.

Plans for 1977-80

I.62. Fuel performance and behaviour will be reviewed and, if necessary, steps taken to obtain a clear picture of the problems encountered. Fuel fabrication technology for and fuel behaviour in high-temperature reactors and fast breeders will be carefully evaluated and, if necessary, discussed at meetings which could be held during this period. Many requests from developing countries for technical assistance in the field of fuel element fabrication and for advisory missions are expected.

Fuel reprocessing and recycling

Objective

I.63. The objective is to analyse the latest techniques in fuel reprocessing and to evaluate all aspects of plutonium recycling, taking into consideration environmental constraints and general fuel cycle economics.

Results to date

I.64. Little effort has so far been devoted to this component owing to a shortage of staff and to the difficulties involved in dealing with fuel reprocessing activities on which the information is often regarded as confidential. Plutonium recycling was analysed by a panel convened in 1971.

Plans for 1975-76

I.65. In view of the increasing number of nuclear power plants and the possible environmental effects of large quantities of irradiated fuel, this component will be reactivated in collaboration with the Division of Nuclear Safety and Environmental Protection, the purpose being to evaluate existing reprocessing capabilities. An advisory group on fuel reprocessing and recycling techniques planned for 1976 will consider the influence of environmental constraints on fuel reprocessing costs, bearing in mind the need to provide developing countries with adequate reprocessing services.

I.66. As a contribution to overall fuel cycle technology, a symposium on enrichment and reprocessing experience and prospects is planned for 1976.

Plans for 1977-80

I.67. Constant attention will be paid to the reprocessing of fuel from fast reactors and high-temperature reactors, to plutonium recycling, to the development of new techniques and facilities and to the operating experience and the technical, economic and safety aspects of the large facilities for reprocessing ligh-water reactor fuel elements which are expected to enter service in the second half of this decade.

Nuclear power project implementation

OBJECTIVE

I.68. The objective is to assist Member States in nuclear power planning and in the implementation of nuclear power projects.

STRUCTURE

I.69. This sub-programme consists of two components, which are described in the following paragraphs.

Nuclear power project implementation

Summary by programme components

Table I.7

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Nuclear power market survey	1.4	0.4	53 500	10 000	-	200	63 700
Assistance in nuclear power planning	5.2	2.0	202 600	-	-	20 400	223 000
Linguistic, printing and publishing services	-	-	-	-	-	69 000	69 000
TOTAL	6.6	2.4	256 100	10 000	-	89 600	355 700

Nuclear power market survey

Objective

I.70. The objective is to maintain a detailed, up-to-date picture of the potential demand for nuclear power plants in developing countries.

Results to date

I.71. This component was initiated in 1971. Missions were sent to 14 Member States and the results of a market survey of the potential demand for nuclear power in these countries were presented to the General Conference in 1973. The component entitled "Small and medium-sized reactors" has been incorporated in this programme component.

Plans for 1975-76

I.72. The results of the nuclear power market survey will be up-dated by improving its methodology and by taking into account changes in basic parameters such as oil prices and capital costs. The increase in oil prices would obviously lead to a great expansion in the market for small and medium-power reactors if commercially proven models were available. This warrants renewed and strong efforts to promote the design of reactors of proven types in the 100-500 MW(e) range, by informing manufacturing countries and reactor suppliers as accurately as possible of the potential market, and to encourage the standardization of new designs or the adaptation of existing ones. In this context, a first panel meeting of government and industry representatives has already been scheduled for October 1974 to exchange information about the most recent market estimates and to review the available reactor designs. An advisory group meeting of a similar kind is planned in each of the years 1975 and 1976, as it is expected that power plant designs may be discussed from the point of view both of recently completed plants and of new commercial developments in the 100-500 MW(e) plant size range.

I.73. The up-dating of the market survey will involve the incorporation of data on further countries for which nuclear power planning studies have been performed and of new data on the countries originally covered by the survey; it is expected that this activity will be carried out mainly within the Secretariat.

Plans for 1977-80

I.74. Meetings of advisory groups and of consultants will be held to the extent necessary and the market survey will be up-dated periodically.

Assistance in nuclear power planning

Objective

I.75. The objective is to provide guidance in the early planning, evaluation and implementation of nuclear power projects.

Results to date

I.76. This component was initiated in 1959. A series of training courses on technical and economic aspects of nuclear power has been held, the most recent being in Bangkok in December 1973. Special missions and advisory services requested by Argentina, Brazil, Chile, Egypt, Greece, Korea, Pakistan, Peru, the Philippines and Thailand have helped with the assessment of the need for nuclear power programmes. A nuclear power planning study was performed in Iran in 1973. The Agency has participated as executing agency in a detailed feasibility study for the first nuclear power station in the Philippines. A guidebook on the main steps in the decision process leading to the initiation of a nuclear power programme has been prepared.

Plans for 1975-76

I.77. It is certain that the requests for assistance in nuclear power programme planning and nuclear power project implementation will increase greatly as more developing countries face the need to embark on nuclear power programmes. The Agency will endeavour to meet these requests by performing nuclear power planning studies and through publications; it also aims to give advice, in response to requests from individual countries, on the various steps leading up to a nuclear power project.

I.78. It will be necessary to establish procedures for dealing in a systematic and orderly fashion with requests for advice and assistance and to ensure that consistent advice is given to all countries. For this purpose it is planned to publish manuals which

will provide possible solutions to technical and economic problems concerning power station projects; such problems arise in the earliest stages of a project and continue into the operational stage. These manuals are intended primarily for use by utilities and power generating authorities, but they will also be suitable for use by Agency technical assistance experts. The writing of these manuals will require the services of consultants for up to six man-months each year over a period of about three years.

I.79. The methodology developed for and the experience gained through the market survey of the potential demand for nuclear power have given the Agency the ability to perform nuclear power planning studies for Member States; more than ten requests for assistance have been received following the increase in oil prices and further requests must be expected. Nuclear power planning studies should cover the economic feasibility not only of a first nuclear power station but also of long-term nuclear power programmes comprising several stations; they should also indicate the timing of nuclear power programmes and the steps to be taken in their initiation. The economic ground rules, the time plans and the limitations specific to a particular country must be given greater consideration in a nuclear power planning study than in a general market survey. In the interests of greater thoroughness in carrying out nuclear power planning studies, the methodology of the market survey will be continually improved, priority being given to load forecasting techniques and the more realistic mathematical modelling of hydroelectric systems (see para. I.21 above).

I.80. It is expected that a UNDP-financed interregional seminar on nuclear power planning will be held early in 1975.

I.81. It is planned that three Professional staff members should devote their efforts almost exclusively to providing advice, on both projects and field activities, to developing countries; the provision by Agency staff of technical support for training courses, study visits and fellowships alone is expected to take up about one man-year annually. The three Professional staff members would also help in collecting and analysing data as part of the information collection exercise described in paras I.19 and 20 above. A member of the existing Professional staff could be assigned to this work, but two additional P-4 posts would also be needed. Moreover, some additional travel funds would be required.

Related activities

I.82. The related activities in 1975-76 will comprise the publication of several guide-books on such subjects as organization and staffing requirements and the training of nuclear power project staff; the guide-books will cover all stages from initial consideration of the project to steady operation of the nuclear power plant. In addition, it is expected that advisory services will be requested in connection with nuclear power projects already under way.

Plans for 1977-80

I.83. It is expected that requests for advisory services will continue to increase because of the growing number of nuclear power programmes and projects in developing countries.

Nuclear power plant technology and reliability

OBJECTIVE

I.84. This sub-programme, formerly entitled "Operation of Nuclear Power Plants", has as its objective the provision of general - but analysed and evaluated - information on the present status of power reactor technology and operation and the furnishing of advice to countries operating power reactors or about to embark upon nuclear power programmes, so as to help obtain an assurance of plant reliability over the entire intended plant lifetime.

An additional objective is to co-ordinate development efforts and work on standards and quality assurance programmes when necessary.

STRUCTURE

I.85. This sub-programme consists of four components, which are described in the following paragraphs. The activities constituting the former component entitled "Nuclear facilities directory", which were carried out by the Division of Scientific and Technical Information from 1972 to 1974, are under examination with a view to proposing annual publications of maximum usefulness to Member States.

Nuclear power plant technology and operational reliability

Summary by programme components

Table I.8

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Nuclear power plant operating experience	0.9	1.0	42 000	-	-	1 000	43 000
Nuclear power plant reliability	2.6	0.6	105 000	41 000	7 500	5 900	159 400
New power reactor technology	1.4	0.6	54 000	26 500	7 500	3 500	91 500
Multipurpose applications	0.5	0.3	18 900	-	-	1 900	20 800
Linguistic, printing and publishing services	-	-	-	-	-	20 000	20 000
TOTAL	5.4	2.5	219 900	67 500	15 000	32 300	334 700

Nuclear power plant operating experience

Objective

I.86. The objective of this component, previously entitled "Nuclear power station operation", is to collect, evaluate, analyse and publish annual reports on operating experience with nuclear power stations in Member States and thereby to make generally available data for the assessment and improvement of nuclear power station reliability.

Results to date

I.87. This component was initiated in 1969, and since 1970 a report on operating experience with nuclear power stations has been published each year. Improvements have been made in the format of the reports and in the information they contain.

Plans for 1975-76

I.88. As the number of reactors covered by the annual reports increases and the data collection standards become more generally accepted, the importance of the reports as a basis for statistical analysis and assessment will increase. The reports will be supplemented by publications of an analytical character. The format of the reports will be reviewed regularly with the aid of consultants.

Plans for 1977-80

I.89. The reports have already met with great interest in Member States and it is expected that they will continue to be among the more important of the Agency's regular publications.

Nuclear power plant reliability

Objective

I.90. The objective of this component, which incorporates activities previously included in the sub-programme entitled "Reactor Engineering and Components", is to assist Member States, and especially developing countries, in embarking upon nuclear power programmes and achieving maximum reliability of nuclear power stations throughout their expected commercial life by collecting, evaluating and disseminating information on specifications, quality assurance programmes and methods and operating practices and by providing direct advice in response to requests.

Results to date

I.91. This is a new component, initiated in 1973, when it was recognized that the International Working Groups on Pressure Vessels, Nuclear Power Plant Control and Instrumentation, and Non-Destructive Testing should have the same overall objective, which was defined by a consultants' meeting and a panel early in 1973. A panel meeting to recommend minimum requirements for quality assurance programmes is being held in 1974. The Working Group on Pressure Vessels has concentrated on the publication of summary status reports.

Plans for 1975-76

I.92. An advisory group meeting is planned for 1975 and another for 1976 to recommend reliability specifications for nuclear power systems and components, and a symposium will be convened in 1975 to discuss quality assurance methods and techniques which have been applied to nuclear power plant design. It is further expected that advisory missions will be requested by Member States to assist in the establishment of reliability and quality assurance programmes for nuclear power projects. An exchange of data on the specifications to be used in national reliability information systems will be established.

I.93. In view of the acceleration of nuclear power programmes in Member States, it is proposed that the Agency's activities under this programme component be stepped up in close co-ordination with the nuclear safety programme and that priority be given to meeting the most urgent needs for quality assurance manuals and standardized technical specifications. No additional post will be needed for this purpose, but the additional use of consultants for up to six man-months in 1975 and in 1976 and one additional advisory group meeting in each year will be required for reviewing manuals on quality assurance programming and organization and the implementation of quality assurance measures.

Plans for 1977-80

I.94. The programme will be expanded to include engineering aspects of reliability and quality assurance, the aim being to provide Member States with more detailed information and recommendations.

Related activities

I.95. The present activities of the Working Groups on Non-Destructive Testing, Pressure Vessels and Nuclear Power Plant Control and Instrumentation are being reviewed in 1974.

New power reactor technology

Objective

I.96. The objective is the dissemination of information on new developments relating to power reactor systems which have reached or are close to reaching commercial maturity, such as high-temperature gas-cooled reactors and liquid-metal fast breeder reactors.

Results to date

I.97. This component supersedes the sub-programme entitled "Advanced Reactors", which was initiated in 1968 with a symposium on advanced and high-temperature gas-cooled reactors. The International Working Group on Fast Reactors (IWGFR), established in 1968 as part of the "Advanced Reactor" sub-programme and consisting of representatives from seven countries with large programmes in this field, has co-ordinated and sponsored a number of international conferences and specialists' meetings on fast reactors.

I.98. A study group on steam generators for liquid-metal fast breeder plants has been planned for 1974. In addition, IWGFR has sponsored three specialists' meetings dealing with thermal transients, sodium valves and emergency shut-down cooling and co-sponsored an international conference on fast reactor power stations.

Plans for 1975-76

I.99. A symposium on advanced gas-cooled reactors, originally scheduled for 1974, will be held in 1975. It is planned to concentrate on technological and safety aspects of advanced gas-cooled systems at this symposium, which will be organized jointly by the Division of Nuclear Power and Reactors and the Division of Nuclear Safety and Environmental Protection.

I.100. The commissioning and operation of various liquid-metal fast breeder demonstration plants during the next few years will provide important information on the future development of large commercial fast reactor plants. A symposium to review operating experience with and the performance of such demonstration plants may be organized in 1976. In addition, annual reports on operating experience with nuclear power stations will include data on advanced reactors and pilot plants. Annual meetings of IWGFR will be held in 1975 and 1976.

Plans for 1977-80

I.101. The potential of high-temperature reactors as direct suppliers of heat for industrial processes such as steam generation, hydrogen production and coal gasification and the possibilities which they offer for more efficient power generation and the achievement of high conversion ratios have evoked strong interest in these reactors. The development of high-temperature gas-cooled reactors and heavy-water reactors will be followed carefully and meetings will be sponsored when there is enough information to justify them.

I.102. Several large liquid-metal fast breeders will enter service during this period. The technical experience gained in constructing and operating such reactors will be reviewed at specialists' meetings.

Multipurpose applications

Objective

I.103. The objective is to foster the exchange of information on applications of nuclear power for purposes other than electricity production with a view to helping Member States to assess the potential role of nuclear power in, for example, meeting the water requirements of metropolitan areas, industry and desert areas, in district heating and in providing

heat for industry. An exchange of information on the long-term prospects of nuclear energy centres for industrial and agro-industrial development will also be sponsored.

Results to date

I.104. This component was initiated as a sub-programme in 1963, and the Agency has since served as a focal point for the dissemination of technical information on nuclear desalting. Advisory missions on the use of nuclear power in desalination, mainly for domestic water supplies in metropolitan areas, have been sent to Pakistan and Peru. Research contracts have been awarded and a panel meeting was held in 1971. A technical report on the cost of desalination has been published. A study group on agro-industrial complexes was held in 1971 and research contracts have been awarded. A study group meeting on multipurpose applications of heat from nuclear reactors has been planned for 1974.

Plans for 1975-76

I.105. Continued information exchange through Agency meetings is planned. A part of the 1976 conference on the role of nuclear power in meeting world energy demands may be devoted to applications other than electricity production. It is also expected that several Member States will request advisory services, particularly in relation to nuclear desalting. The technical development of desalting processes and the progress of projects now involving daily capacities of about 100 million gallons, at which level nuclear sources of heat are economically attractive, will be followed closely. Research contracts will be awarded for the study of multipurpose applications and of uses of waste heat from nuclear plants. A seminar on multipurpose applications is planned for 1976.

Plans for 1977-80

I.106. One or two meetings on different multipurpose applications are planned for each year, and it is expected that four to six special missions will be organized during this period. The work is likely to increase in importance towards the end of the period.

Co-operation with other organizations

I.107. The component involves co-operation with the United Nations and its economic commissions, UNIDO, FAO, EURATOM, OECD(NEA), UNIPEDE and ISO.

Reactor physics and advanced nuclear power technology

OBJECTIVE

I.108. The objective is to provide for information exchange and other forms of technical collaboration among Member States with regard to advanced nuclear technologies such as fusion reactors, direct-cycle gas-cooled high-temperature reactors and fast breeders and to ensure the exchange of the latest information in the field of magnetohydrodynamic electrical power generation (MHD).

STRUCTURE

I.109. This sub-programme consists of three components, which are described in the following paragraphs, and incorporates subjects previously dealt with in the sub-programmes entitled "Advanced Reactors" (partly) and "Advanced Nuclear Technology".

Reactor physics and advanced nuclear power technology

Summary by programme components

Table I.9

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Advanced reactor concepts	1.1	0.4	38 000	22 000	-	1 600	61 600
Advanced energy conversion	1.0	0.5	35 800	5 000	-	1 700	42 500
Reactor physics and computations	1.0	0.5	35 800	24 000	48 000	1 900	109 700
Linguistic, printing and publishing services	-	-	-	-	-	45 000	45 000
TOTAL	3.1	1.4	109 600	51 000	48 000	50 200	258 800

Advanced reactor concepts

Objective

I.110. The objective is to establish high-level international collaboration in information exchange and joint projects related to the engineering development of advanced reactor concepts such as advanced gas-cooled fast-breeder reactors, direct-cycle high-temperature reactors, fusion reactors and advanced research/test reactors.

Results to date

I.111. This component was initiated in 1972 with the organization of a study group on gas-cooled fast-breeder reactors. In 1973 a consultants' meeting was held in connection with the convening of a working group on fusion reactors, as proposed by the Agency's International Fusion Research Council. A workshop on fusion reactor design problems has been planned for 1974.

Plans for 1975-76

I.112. Seminars are planned for 1975 and 1976 on selected aspects of fusion reactor technology, which consists of the following main problem areas: the operational cycle; materials, construction and maintenance; the tritium fuel cycle (including breeding and recovery); the energy cycle; safety and the environmental impact. An advisory group meeting on developments in ultrahigh-temperature gas-cooled reactors will be held during 1975 and one dealing with high-intensity neutron sources for research on fusion reactor materials will be held during 1976.

Plans for 1977-80

I.113. The Agency will continue to concern itself with developments in the technologies of high-temperature and ultrahigh-temperature gas-cooled reactors, gas-cooled fast breeders and fusion reactors and will sponsor one or two symposia and a number of specialized meetings on appropriate topics.

Advanced energy conversion

Objective

I.114. The objective is to provide for the exchange among Member States of information on developments concerning new, more effective methods of converting thermal to electrical energy, in particular MHD.

Results to date

I.115. This component, which corresponds to the former sub-programme entitled "Advanced Nuclear Technology", was initiated through the Joint OECD(NEA)/IAEA International Liaison Group on MHD Electrical Power Generation, which was established in 1966 and has developed useful collaboration among a number of Member States in an advanced technical field where research and development costs are high. In addition to the holding of three conferences and a number of specialists' meetings, three internationally authoritative status reports have been published.

Plans for 1975-76

I.116. The energy crisis has created considerable new interest in the development of closed-cycle MHD systems, which have the potential for increasing plant efficiencies from the present 40% level to 60%, with the attendant important benefits of improved fuel utilization, reduced harmful effluent discharge and better economics. MHD generators also offer prospects for the production of synthetic fuels, such as hydrogen. Potential nuclear heat sources for MHD electrical generators are ultrahigh-temperature gas-cooled reactors and fusion reactors. In the light of this situation, the Agency may sponsor in 1975 and 1976 technical meetings recommended by the Joint OECD(NEA)/IAEA International Liaison Group.

Plans for 1977-80

I.117. Developments (particularly those concerning possible applications of ultrahigh-temperature nuclear reactors in closed-cycle MHD systems) will be followed with a view to determining the Agency's future role in this field.

Reactor physics and computations

Objective

I.118. The objective is to promote and maintain international collaboration and the exchange of information in connection with the development of the analytical methods and codes required for understanding the behaviour of reactors under normal and abnormal operating conditions, solving radiation shielding measurement problems and studying the effects of radiation on reactor materials.

Results to date

I.119. This component was initiated in 1959. With the progress of reactor physics studies, the emphasis has shifted from general aspects to particular problems and to the development of efficient computer techniques for the study of large, highly complex power reactor systems. In recent years the Agency has organized meetings on numerical reactor calculations, reactor burn-up physics and the calculation of hot channel factors for fast reactors, sponsored summer schools in reactor physics and supported various co-ordinated research programmes - including the NPY project [I.3]. An Agency-

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[I.3] See footnote [F.2] above.

sponsored international working group on reactor radiation measurements has produced two documents and sponsored international intercomparisons of calorimeters, chemical dosimeters and neutron spectrum evaluation methods. The role of this working group within the context of future programmes of the Division of Nuclear Power and Reactors is under review.

Plans for 1975-76

I.120. A seminar on nuclear data requirements for shielding calculations may be held in 1975, in connection with a meeting on nuclear data needs for shielding calculations supported by the Nuclear Data Section and possibly co-sponsored by OECD(NEA). Important developments in reactor safety research will be reviewed in seminars dealing with accident analysis (1975), including such cases of interest as operational transients due to a power-coolant mismatch (1976). A seminar to review recent important developments in Monte Carlo methods for reactor calculations is planned for 1976 and a symposium on reactor radiation measurements for the analysis of radiation damage may be held in the same year.

Plans for 1977-80

I.121. A small number of meetings on special topics relating to reactor physics, computational methods and radiation measurements and effects will be sponsored. An international intercomparison of radiation measurement techniques and equipment, especially for fast reactor radiation environments, may be organized. In this connection, it is likely that the scope of the activities of the International Working Group on Reactor Radiation Measurements will be changed.

J. NUCLEAR SAFETY AND ENVIRONMENTAL PROTECTION

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table J.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	382 379	522 500	52 500	204 400	256 900	779 400	990 600
Consultants	69 751	19 000	800	96 800	97 600	116 600	167 600
Overtime	296	300	-	(300)	(300)	-	-
Temporary assistance	8 510	1 100	100	(100)	-	1 100	1 200
Sub-total	460 936	542 900	53 400	300 800	354 200	897 100	1 159 400
Common staff costs	124 899	168 200	18 200	66 300	84 500	252 700	318 700
Travel	38 206	49 000	3 500	52 400	55 900	104 900	129 900
Meetings							
Conferences, symposia, seminars	71 769	102 000	5 000	(35 000)	(30 000)	72 000	210 000
Technical committees, advisory groups	147 148	175 000	10 000	151 100	161 100	336 100	276 400
Representation and hospitality	4 492	4 900	400	3 400	3 800	8 700	9 600
Scientific and technical contracts	175 673	197 000	10 000	65 000	75 000	272 000	225 000
Scientific supplies and equipment	9 597	15 000	1 500	1 500	3 000	18 000	18 000
Common services, supplies and equipment	486	-	-	17 500	17 500	17 500	19 000
Other items of expenditure							
Linguistic services	64 485	69 000	9 000	-	9 000	78 000	85 000
Printing and publishing services	185 008	177 000	23 000	52 000	75 000	252 000	306 000
TOTAL	1 282 699	1 500 000	134 000 8.9%	675 000 45.0%	809 000 53.9%	2 309 000	2 757 000

SUMMARY OF MANPOWER

Table J.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	7	9	9	5	14	16
P-4	6	8	8	3	11	12
P-3	2	3	3	1	4	4
Sub-total	16	21	21	9	30	33
GS	11	13	13	5	18	19
M&O	-	-	-	-	-	-
TOTAL	27	34	34	14	48	52

CHANGES IN COSTS AND MANPOWER

Costs

J.1. The total cost of this programme is expected to increase in 1975 by $809 000, of which $134 000 will be required to cover salary and price increases and $675 000 represents a programme increase.

J.2. The programme increase is mainly attributable to the need for nine additional Professional and five GS posts and to the filling of posts which during the previous year had been kept vacant, for which it is estimated that $270 700 will be required, taking into account some delays in recruitment for the new posts.

J.3. A considerable part of the programme increases of $96 800 in respect of consultants' services and of $116 100 for meetings is required for the preparation and updating of standards for nuclear safety. A large portion of the programme increase of $65 000 for research contracts is required to carry out research in waste management, especially the aspects relating to environmental impact (see para. J.114 below). Of the programme increase of $52 000 for printing and publishing services, approximately one half will be required to publish manuals and codes, as explained in the radiological safety and waste management sub-programmes.

Manpower

J.4. As will be seen from Table J.2 above, nine additional Professional posts and five GS posts are foreseen for 1975 in order to meet the needs of the proposed programme.

J.5. In the Radiological Safety Section one additional P-5 and one additional GS post will be needed owing to the increased participation of staff members in field activities and the overall expansion of the programme at Headquarters, including the joint IIASA/IAEA project (see para. J.51 below). One additional health physicist at the P-3 level will be required to provide radiological protection services on a day-to-day basis for the staff in the Agency's laboratories, safeguards inspectors and other staff who may be exposed to radiation. An additional GS staff member will be needed to maintain the necessary records for such services (see para. J.67 below).

J.6. For the waste management sub-programme, the increased activities in the field as well as at Headquarters will require one additional P-4 post and one GS post.

J.7. Finally, as explained in para. J.133 below, the important increase expected in nuclear safety activities will call for four Professional staff members at the P-5 level and two staff members at the P-4 level, together with two GS posts to render supporting services.

J.8. In 1976, one additional P-5 post will be required for the radiological safety sub-programme and two Professional posts, one at the P-5 and one at the P-4 level, for the waste management sub-programme, together with one additional GS post.

THE PROGRAMME

OBJECTIVE

J.9. The objective is to ensure the safe utilization of nuclear energy and the protection of man and his environment from the harmful effects of nuclear radiation and radioactive and non-radioactive releases from nuclear facilities.

RESULTS TO DATE

J.10. The programme was initiated in 1957 and considerably broadened in 1972. Work relating to radiological safety, nuclear safety and waste management has included the organization of 35 symposia and seminars, 96 panel meetings and 16 research co-ordination meetings.

J.11. One hundred and thirty-three publications have been issued, comprising the proceedings of 33 symposia and seminars, 44 publications in the Agency's Safety Series and 24 in the Technical Reports Series, 14 volumes of Research Abstracts and 18 other technical publications.

J.12. Forty-nine requests for special missions on reactor siting and on the safety assessment of various nuclear power plants have been satisfied. Safety inspections have been carried out in 12 countries to review the nuclear and radiological safety achieved at various reactor centres. Eight regional study group meetings and travelling seminars have been organized and five study tours held.

PLANS FOR 1975-80

J.13. Several activities will be phased out, either because of the relatively low priority assigned to them or because the subjects in question will have been dealt with to the extent that only periodic up-dating will be necessary. Some newly emerging problems such as the handling of actinides will require special study. It will, of course, continue to be important to give adequate assistance to developing countries in regard to the safety aspects of a number of nuclear activities other than nuclear power; this assistance should, however, more and more take the form of field activities (missions, regional study groups, etc.) based on the expertise accumulated and reflected in various Agency publications and should, at the same time, be directed towards preparing the proper infrastructure for the safe development of nuclear power. But the main emphasis in the programme will definitely shift to the major safety and waste management problems to which the acceleration of nuclear power programmes in developed and developing countries will give rise sooner and on a wider scale than previously foreseen.

J.14. Work will be carried out in the following areas:

(a) The preparation and up-dating of safety standards and recommendations for the safe performance of nuclear activities;

(b) The promotion and co-ordination of research related to protection of man and his environment from the harmful effects of radioactive and non-radioactive releases from nuclear facilities, and the collection, exchange and dissemination of information on the results of such research and on development in corresponding techniques and methods; and

(c) The provision of assistance in the elaboration and implementation of necessary measures concerning radiation protection, waste management and nuclear safety to be applied in nuclear activities.

CO-OPERATION WITH OTHER ORGANIZATIONS

J.15. The programme involves co-operation with ILO, FAO, WHO, WMO, UNEP, ECE, OECD(NEA), ICAO, IATA, ICRP, IMCO, ISO, UNSCEAR, ICRU, the Commission of the European Communities, CMEA and UNESCO.

STRUCTURE

J.16. This programme consists of four sub-programmes which are dealt with separately below.

Summary of manpower and costs

Table J.3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Radiological safety	10.8	7.3	830 200	11.8	7.3	1 015 300
Waste management	8.3	5.0	789 400	10.3	5.5	817 900
Nuclear safety	10.3	5.5	667 100	10.3	6.0	878 500
The use of nuclear explosives for peaceful purposes	0.6	0.2	22 300	0.6	0.2	45 300
TOTAL	30.0	18.0	2 309 000	33.0	19.0	2 757 000

SUB-PROGRAMMES

Radiological safety

OBJECTIVE

J.17. The objective is to provide safety standards, recommendations, guidance, assistance and services to Member States aimed at ensuring the protection of man, his property and the environment against any possible harmful effects of radiation arising in the peaceful uses of atomic energy.

RESULTS TO DATE

J.18. This sub-programme was initiated in 1957. The work has included the organization of 16 symposia and seminars, 48 panel meetings, 7 regional study group meetings, 9 research co-ordination meetings, 7 training courses and 2 study tours. This has resulted in the issuing of 16 volumes of proceedings, 29 publications in the Safety Series, 7 in the Technical Reports Series, 2 in the Study Tour Reports Series, one Directory and a number of miscellaneous documents, some of a recurring nature. Six of the publications in the Safety Series form part of the Agency's Safety Standards and have been approved by the Board of Governors.

PLANS FOR 1975-80

J.19. Work will continue in the following four basic areas:

(a) The preparation and harmonization of radiological safety standards and recommendations for the adequate radiological protection of workers, the general public and the human environment;

(b) The provision of assistance to Member States in applying these standards and recommendations and in training their specialists and technicians;

(c) The promotion and co-ordination of research related to radiological protection; and

(d) The provision of radiological protection services for the Agency's laboratories and for safeguards inspectors and other staff who may be exposed to radiation.

J.20. Over a period of years, emphasis has gradually shifted from the first area to the remaining areas, particularly in connection with the development of nuclear power plants. This trend will continue and existing standards and recommendations will be brought up to date and new topics introduced as the need arises. Special efforts will be made to secure the joint production and endorsement of standards with other international organizations (such as WHO), the adoption of the Agency's standards by Member States and harmonization with international standards.

J.21. The activities relating to matters of direct interest in carrying out nuclear power programmes will be accelerated and expanded, and radiological safety will be an integrated part of the comprehensive training programme referred to in paragraph C.23 above. Although certain activities of lower priority will be curtailed, the accelerated programme together with the expected expansion in training and advisory services will produce a heavy additional work load. A modest increase in Professional and GS posts has been requested to bring the number of staff up to the minimum level necessary to carry out the overall programme.

RELATED ACTIVITIES

J.22. The related activities involve 80-90 research contracts, part of which relate to five co-ordinated programmes, the organization of training courses and other technical assistance services, the application of the Agency's Safety Standards to assisted projects, and the provision of advisory services on request.

CO-OPERATION WITH OTHER ORGANIZATIONS

J.23. In the implementation of this sub-programme co-operation is maintained with many international and regional organizations, including ILO, FAO, WHO, UPU, ECE, OECD(NEA), IATA, ICAO, ICRP, ICRU, IMCO, ISO, the Central Office for International Railway Traffic, UNSCEAR and UNEP.

STRUCTURE

J.24. This sub-programme consists of six components which are described in the following paragraphs.

Radiological safety

Summary by programme components

Table J.4

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Safety standards	1.0	0.5	35 300	-	45 000	20 500	100 800
Radiological protection of workers	1.9	1.2	72 600	28 300	27 000	6 500	134 400
Radiological protection of the general public and the environment	2.2	1.2	84 000	58 300	50 000	6 700	199 000
Radiological safety features of nuclear facilities	2.1	1.6	90 100	42 300	-	8 500	140 900
Radiological protection services for the Agency's staff and laboratories	2.6	2.2	95 900	-	-	1 000	96 900
Emergency assistance in the event of radiation accidents	1.0	0.6	34 900	-	-	1 000	35 900
Cost not attributable to an individual programme component	-	-	-	16 000	-	18 300	34 300
Linguistic, printing and publishing services	-	-	-	-	-	88 000	88 000
TOTAL	10.8	7.3	412 800	144 900	122 000	150 500	830 200

Radiological safety standards

Objective

J.25. The objective is to prepare and bring up to date, as necessary, safety standards for the protection of health and minimization of risk to life and property and to seek the harmonization of existing standards.

Results to date

J.26. This component, formerly entitled "Safety standards for radiological protection", was initiated in 1958 and now incorporates the former component entitled "Safe transport of radioactive materials".

J.27. The Agency's safety standards comprise basic safety standards, specialized regulations and codes of practice which, on approval by the Board of Governors, are recommended for adoption by Member States and appropriate international organizations. The Basic Safety Standards for Radiation Protection were published in 1962 and first revised in 1967; they will be revised again in 1975 or 1976 in collaboration with WHO, ILO and OECD(NEA). The Radiation Protection Standards for Radioluminous Timepieces, jointly prepared by the Agency and OECD(NEA), were published in 1967. The Regulations for the Safe Transport of Radioactive Materials were published in 1961 and revised in 1964, 1967 and 1973. These Regulations have now been adopted by virtually all international organizations concerned with the transport of goods, and by many Member States. Codes of practice have been published on the following topics:

(a) Safe Handling of Radionuclides (Safety Series No. 1);

(b) Provision of Radiological Protection Services (Safety Series No. 13);

(c) Basic Requirements for Personnel Monitoring (Safety Series No. 14); and

(d) Radiation Protection in the Mining and Milling of Radioactive Ores (Safety Series No. 26).

Plans for 1975-76

J.28. In view of the acceleration and expansion of priority work related to the development of nuclear power programmes, the activities related to the establishment of international radiation protection standards for radioisotopic cardiac pace-makers and for other selected types of radionuclide-containing products or devices available to the public will be stopped or phased out rapidly, in consultation with any other international organizations involved. The proposal to convene the advisory group on the practical application of quantities and units in the measurement of radiation for protection purposes, originally planned for 1974 and later postponed until 1976, will no longer be retained in the programme.

J.29. An advisory group will be convened in 1976, if possible in collaboration with WHO and ILO, to review and bring up to date the code of practice on basic requirements for personnel monitoring which will cover all aspects of individual monitoring and area monitoring necessary to assure compliance with the standards for radiological protection of workers. Continuing efforts will be made to harmonize national regulations for the safe transport of radioactive materials and information will continue to be collected on transport accidents involving radioactive materials. A symposium is planned for 1976 at which specialists will discuss packaging design, construction and testing and other practical problems relating to the safe transport of radioactive materials. Advisory services will be provided on the interpretation and implementation of the transport regulations and other safety standards. The training film on the packaging and transport of radioactive materials will be brought up to date. The Agency's safety standards will continue to be applied to Agency-assisted projects, and health and safety inspection missions will be sent, as required, to countries that have concluded agreements with the Agency on assisted projects.

Related activities

J.30. Research contracts will be awarded under co-ordinated programmes related to performance tests for transport packaging.

Plans for 1977-80

J.31. Existing safety standards will be kept under review and revised when necessary, and standards on new topics will be prepared as the need arises. It is expected that the next major review of the transport regulations will be undertaken about 1980, but Member States will be consulted in 1976 on the need for an earlier review. The advisory material on the application of the transport regulations, first issued in 1973, will be brought up to date at intervals of about two and a half years and up-to-date lists of competent authorities will continue to be issued annually. In collaboration with the Legal Division, continuing attention will be devoted, through regional seminars and advisory services, to the harmonization of national legislation and standards for radiation protection. Health and safety inspection missions will continue to be sent as appropriate to facilities in Member States which have concluded agreements with the Agency concerning assisted projects.

Co-operation with other organizations

J.32. This component involves co-operation with ILO, WHO, OECD(NEA), ICRP, ICRU, UPU, ECE, ICAO, IATA, IMCO, ISO and the Central Office for International Railway Traffic.

Radiological protection of workers

Objective

J.33. The objective is to provide recommendations and guidance on protection against possible radiation damage to persons who are occupationally exposed and to assist Member States in implementing such recommendations.

Results to date

J.34. This component was initiated in 1958. The work has resulted in the publication of recommendations and guidance to Member States on the organization of radiation protection programmes, on the safe operation of facilities and the safe handling of radioactive materials, on physical and medical surveillance of workers, including personnel and area monitoring, on protective clothing and devices, on emergency plans and procedures, on the handling of radiation accidents and on the diagnosis and treatment of radiation injury. The proceedings of 11 symposia and seminars have been published and 12 publications have been issued in the Safety Series and Technical Reports Series. Seven regional training courses and six regional study group meetings have included, as a substantial part of their programmes, the subject of radiological protection of workers. Lectures on radiation protection procedures have been given at many training courses, dealing primarily with other topics, which have been arranged by other Divisions of the Agency and by other organizations.

Plans for 1975-76

J.35. Emphasis will be placed on the radiation protection aspects of the handling of substances of high radiotoxicity, including plutonium, and a seminar is planned for 1976, if possible in co-operation with OECD(NEA), on radiological safety problems in the handling of transuranium elements.

J.36. An advisory group is planned for 1976 to study the special radiological safety aspects of the use of plutonium as a reactor fuel. Guidance will be issued on the safe operation of particle accelerators, and on decontamination procedures for persons, equipment and facilities. Guidance will also be prepared on the handling of radiation accidents, including the care of burns resulting from accidents in the use of sodium or potassium as reactor coolants. An educational seminar is planned for 1975, if possible in co-operation with WHO, on the diagnosis and treatment of incorporated radionuclides.

J.37. Several developing countries have now embarked or soon will embark on nuclear fuel fabrication. A manual on safety requirements for fuel fabrication plants will therefore be prepared as part of the comprehensive programme on safety in the fuel cycle; its preparation will require the advice of consultants and the holding of one advisory group meeting in 1975, and possibly a second meeting in 1976.

J.38. A number of developing Member States are already faced with the problem of disposal of spent fuel elements withdrawn from research and isotope production reactors. The cost of transporting irradiated fuel elements to reprocessing plants is high and in many cases the withdrawn elements are put into temporary storage, sometimes under conditions that are not entirely satisfactory. The accelerated development of nuclear power programmes is expected to make this problem more widespread and more acute. A study will therefore be made of the means of providing developing Member States with assistance in transporting spent fuel elements to reprocessing plants in other countries, if such assistance is required. The services of consultants and funds for travel will be required for this study in 1975.

J.39. A seminar is planned for 1976 to consider the economic aspects of radiation protection programmes in different types of nuclear activities. It is hoped that this meeting might assist in the formulation of guidelines for the selection of procedures that

would be economic without any sacrifice of the level of safety provided for workers or members of the public. A seminar is also planned for 1976 to consider the application of computers in all aspects of radiation protection and in the storage and retrieval of records. This seminar will cover topics which are dealt with in other components of the sub-programme.

J.40. Regional seminars will be convened in appropriate centres covering, among other topics, all aspects of the radiological protection of workers. The postal glass dosimeter intercomparison service for gamma-ray fields will be continued and expanded.

J.41. An attempt will be made to collect information on the doses received by workers so that the Agency may become an authoritative source of information on doses received from occupational exposure in the nuclear industry in different countries and will be in a better position to assess the possible contribution of occupational exposure to the total exposure of the population. Further efforts will be made to collect information on registries of persons carrying significant body burdens of plutonium and other trans-uranium elements.

Related activities

J.42. The related activities involve about 30 research contracts, part of which are awarded under co-ordinated programmes. Subject to the availability of funds, regional training courses which cover, among other topics, the radiological protection of workers, will be organized in selected regions.

Plans for 1977-80

J.43. Attention will continue to be given to the special problems arising in the handling of transuranium elements. Symposia and seminars will be organized on such topics as the handling of radiation accidents and the place of chelating agents and other appropriate procedures in the treatment of persons carrying incorporated radionuclides. Emphasis will be placed on the organization of regional seminars and training courses and on the provision of advisory services.

Co-operation with other organizations

J.44. This component involves co-operation with ILO, WHO and OECD(NEA).

Radiological protection of the general public and the environment

Objective

J.45. The objective is to provide guidance on methods for assessing radiological safety, for providing adequate protection for the general public and the environment, for providing adequate environmental surveillance and for evaluating radiation doses to the population.

Results to date

J.46. This component was initiated in 1958. The proceedings of four symposia and seminars have been published and nine publications have been issued in the Safety Series and Technical Reports Series. Seven regional training courses and six regional study group meetings have included, as a substantial part of their programmes, the radiological protection of the general public and the environment. Lectures have been given on this topic at many other training courses and meetings.

Plans for 1975-76

J.47. Emphasis will continue to be given to the development of effective and economic programmes for effluent and environmental monitoring and to the evaluation of whole-

population dose. An advisory group will be convened in 1975, if possible in collaboration with WHO and FAO, to consider the protection of the public in the event of radiation accidents. In collaboration with WHO and, if possible, UNEP, advisory groups will be convened in 1975 to provide guidance on the circumstances under which environmental surveillance over a wider area up to global level might be required as a supplement to local surveillance and on the estimation of collective doses to the population. It is proposed to convene, in 1976, an advisory group on effective environmental monitoring methods for selected radioactive contaminants.

J.48. An advisory group from countries in the catchment area of the Danube will be convened in 1975 and 1976 to study questions of mutual co-operation in relation to the radiological safety aspects of nuclear power programmes in the region. An attempt will also be made to establish a co-ordinated research programme in which institutes within those countries would study the behaviour of selected radioactive contaminants in the Danube catchment area.

J.49. Concurrently with the extension of activities in the environmental field and with the procedures being developed by IMCO for measures concerning the minimization of pollution damage to the marine environment by accidental spillage of noxious substances, the Agency will study the possibility of contributing to the development of such procedures to be applied in cases of accidental release of radioactivity at sea and also the development of procedures for cases of release arising from inland operations and transport. In this connection it is proposed to convene an advisory group in 1976, jointly with the Legal Division, on the procedures to be followed in the event of accidental release of radioactivity during transport of radioactive materials.

J.50. As was recently recognized by the Agency's Scientific Advisory Committee, the public acceptance of nuclear programmes is a matter of great importance. An advisory group on that subject will be convened in 1975 and it is expected that it will need to be reconvened in 1976.

J.51. In collaboration with IIASA, and within the framework of a more general research project on energy systems in which it is engaged, research will be undertaken into the relationships between the perception and recognition of the risks associated with nuclear and other forms of energy and the objective evaluation of the magnitude and acceptability of those risks. These relationships have a direct bearing on public acceptance of nuclear programmes, on the assessment of their environmental effects and on the establishment of nuclear safety standards. This joint project will require the services of one Professional staff member under this sub-programme. Several Governments are already showing interest in the project, and have informally indicated their willingness to lend staff cost-free to the Agency for work on it.

J.52. Regional seminars on radiological and environmental protection will be organized in 1975 and 1976. These seminars will also include aspects of the programme dealt with in other components of this sub-programme.

Related activities

J.53. About ten research contracts have been awarded on environmental monitoring and related topics. Emphasis will be placed on the establishment of co-ordinated programmes of research, and programmes on environmental monitoring for radiation protection similar to that already established in South East Asia will be organized in other regions. Research co-ordination meetings on environmental monitoring will be organized in 1975 and 1976. Subject to the availability of funds, a regional training course of 3-4 weeks' duration covering plans and procedures for handling radiation emergencies that might arise in nuclear power plants will be organized in 1975 for Member States in South East Asia and the Pacific and the Far East. The purpose of the course would be to cover all factors involved in the broad planning, development of procedures, and practical

implementation of programmes for handling radiation emergencies, including arrangements for international co-operation.

Plans for 1977-80

J.54. Work will continue along the same general lines, with special attention being given to effective and economic surveillance programmes, the evaluation of population doses and the public acceptability of nuclear programmes.

Co-operation with other organizations

J.55. This component involves co-operation with WHO, FAO, ICRP, UNSCEAR, WMO, CMEA, OECD(NEA) and UNEP.

Radiological safety features of nuclear facilities

Objective

J.56. The objective is to provide guidance on radiological safety features of the design and operation of nuclear facilities including power reactors, fuel reprocessing plants and laboratories for handling materials of high radiotoxicity

Results to date

J.57. This component was initiated in 1965. It has resulted in the publication of recommendations on radiation safety in "hot" facilities, on techniques for controlling air pollution arising from the operation of nuclear facilities, on safety aspects of the design and equipment of "hot" laboratories and on the safety evaluation of high-activity laboratories. The proceedings of a symposium have been published and two manuals have been published in the Safety Series and one in the Technical Reports Series. Advisory services have been requested by Member States on several occasions in connection with irradiation facilities and radioisotope production and handling laboratories.

Plans for 1975-76

J.58. Work will continue on the provision of guidance for the safety evaluation of "hot" laboratories and on radiological safety aspects of the design and operation of nuclear facilities, including power reactors, fuel reprocessing plants and associated laboratories. Advisory services will be provided on all these subjects at the request of Member States.

J.59. An advisory group will be convened in 1975 to consider the establishment of containment criteria for laboratory enclosures in which radionuclides of different levels of toxicity and activity are to be handled. An advisory group will also be convened in 1975 to study the question of neutron shielding with special reference to compact forms of shielding suitable for use with neutron sources of small physical size. A symposium is planned for 1976 on the design and equipment of "hot" laboratories.

J.60. Manuals will be prepared to complete or up-date the guidance provided on topics of special importance for the radiological safety aspects of nuclear power plants, namely the monitoring of radioactive gaseous and liquid effluents, emergency planning, the design, the choice of constructional materials, and the maintenance and testing of ventilation and air filtering systems. The preparation of these manuals will require the help of consultants and the convening of three advisory group meetings in the period 1975-1976.

J.61. The participation of staff in advisory and safety inspection missions will increase significantly in the coming years. The staff members concerned will also be directly involved in the preparation of some of the standards and guides for the accelerated programme on standards for power reactors.

Related activities

J.62. Subject to the availability of funds, a group scientific visit to countries with advanced nuclear programmes, covering the radiological safety and waste management aspects of nuclear power plants, will be organized in 1975 for selected senior technical staff from those developing countries that have nuclear power plants in operation or in the construction phase. The purpose of the visit would be to acquaint the participants with the actual operating conditions in nuclear power plants and with the practical application of radiological control and waste management procedures.

Plans for 1977-80

J.63. Work will continue along the same general lines, and some emphasis will be given to advisory services, regional seminars and training courses.

Co-operation with other organizations

J.64. This component involves co-operation with ILO and WHO.

Radiological protection services for the Agency's laboratories and staff

Objective

J.65. The objective is to provide adequate radiological protection services for the Agency's laboratories and for staff who may be exposed to radiation in the course of their duties.

Results to date

J.66. This component was initiated in 1963. Radiological protection rules and procedures based on the Agency's safety standards, have been established and kept up to date for all work by Agency staff members which may involve exposure to radiation. Day-to-day monitoring services are provided at the Seibersdorf Laboratory. Film badge and pocket dosimeter monitoring systems and whole-body monitoring and bioassay services are provided for the staff of the Seibersdorf, Monaco and Headquarters laboratories, for safeguards inspectors and for other staff. Monitoring instruments and protective clothing are also provided. Arrangements have also been made to provide suitable medical care for any staff members who may be involved in radiation accidents. A modest stock of special instruments is set aside and maintained in good working order for use in emergency situations.

Plans for 1975-76

J.67. The radiological protection rules and procedures will be kept up to date and extended as required. Personnel monitoring services, training and instruction will be provided as required for staff in the Agency's laboratories at Seibersdorf, Monaco and Headquarters, and for safeguards inspectors and other staff who may be exposed to radiation. Day-to-day monitoring services will continue to be provided at the Seibersdorf Laboratory. The stock of monitoring instruments will be kept up to date and extended as required; all instruments, protective clothing and equipment will be checked periodically. The volume of work will increase substantially with the opening of the safeguards analytical laboratory in view of the hazards involved in the handling and storage of the quantities of plutonium foreseen. It will also be necessary to maintain the necessary records of all monitoring and surveillance procedures in the Agency's laboratories.

Related activities

J.68. The Agency's Laboratory will continue to provide whole-body counting and bioassay services for occupationally exposed staff.

Plans for 1977-80

J.69. The work will continue and will be extended as necessary to meet the requirements of the expanding safeguards inspectorate and the Laboratory. It is important that the radiological protection services provided should be of such a quality that they can serve as an example to Member States. It is expected that the work load will increase markedly in this period.

Emergency assistance in the event of radiation accidents

Objective

J.70. The objective is to help Member States to obtain any additional emergency assistance that they might require in the event of a serious radiation accident.

Results to date

J.71. This component was initiated in 1961. The Nordic Agreement on Emergency Assistance was prepared in co-operation with the Legal Division and signed by Denmark, Finland, Norway, Sweden and the Agency in 1963. Model agreements for the provision of emergency assistance on a bilateral and multilateral basis have been prepared. Document WP/35, setting forth the nature of the emergency assistance that Member States might be willing to make available on request, was prepared in collaboration with ILO, FAO and WHO in 1963 and brought up to date in 1968 and 1971.

J.72. The Agency is prepared to act as an intermediary on request and to send staff members to the site of an accident. An emergency manual has been compiled and a compendium of information for use in controlling emergency situations has been published in the Technical Reports Series. The system for alerting and sending Agency staff to the site of an accident in response to a request received at any time is tested periodically.

Plans for 1975-76

J.73. The emergency assistance system will be maintained and tests of the smooth working of the Agency's response to requests will be made at suitable intervals. The emergency manual will be brought up to date and extended as required. Replacement items and additional items of equipment will be added, as required, to the stock held ready for use in an emergency. New staff members will be given instruction concerning their possible role in providing emergency assistance. Member States will be encouraged to enter into multilateral regional or other agreements for the provision of mutual emergency assistance.

Related activities

J.74. Radiochemical analysis of environmental samples and bioassay measurements can be performed in the Agency's Laboratory as a contribution to the emergency assistance provided for Member States. Specialized instrumentation, including a multichannel pulse height analyser and a sensitive gamma-ray monitor, can be made available on loan to a Member State if required in an emergency situation.

Plans for 1977-80

J.75. The emergency assistance system will be developed and extended as appropriate and tests will be organized from time to time. The equipment will be reviewed as to its suitability from time to time.

Co-operation with other organizations

J.76. This component involves co-operation with ILO, WHO and FAO in the collection and distribution of information and in the provision of assistance when required.

Waste management

OBJECTIVE

J.77. The objective is to elaborate standards of safety concerning the release of radionuclides and other contaminants, to promote and co-ordinate research concerning the dispersion into the environment of radioactive materials, to develop and review techniques for maintaining releases of radionuclides and other contaminants from nuclear industry at acceptable levels for man and his environment, to assess the consequences of actual releases, to develop and disseminate information and to advise Member States on the methods of safe management of radioactive waste.

RESULTS TO DATE

J.78. This sub-programme, which was initiated in 1957, has resulted in the publication of the proceedings of 12 symposia, nine volumes in the Safety Series, 15 in the Technical Reports Series, nine volumes of Waste Management Research Abstracts and six other technical manuals. Thirteen symposia and seminars, 36 panel meetings, seven research co-ordination meetings and three study tours have been organized.

PLANS FOR 1975-80

J.79. The Agency will continue to promote useful research and to provide a forum for discussing future needs of waste management in Member States. These needs will be reviewed and relevant information on developed techniques will be disseminated to Member States through symposia, panels, guide-books and advisory missions. Efforts will be accelerated to provide guidance in waste management technology of immediate interest to those developing Member States that are embarking on nuclear power programmes.

J.80. The activities will also include further studies of the behaviour and fate of radionuclides and other contaminants released from the nuclear fuel cycle, and of the consequences of such releases. These studies will be aimed at establishing safe limits for releases of radionuclides and other contaminants from the nuclear industry. Such studies will be carried out by a number of advisory groups on the basis of detailed information provided by consultants and the Secretariat. The participation of staff [J.1] in advisory or inspection safety missions will increase significantly in 1975 and 1976.

RELATED ACTIVITIES

J.81. The related activities involve 25 to 30 research contracts and agreements, most of which are related to co-ordinated programmes. Requests for technical assistance are expected, and advisory services will be provided on request.

J.82. It is to be noted also that, as in the case of the work on radiological safety, waste management will become an integrated part of the comprehensive training programme referred to in paragraph C.23 above.

CO-OPERATION WITH OTHER ORGANIZATIONS

J.83. This sub-programme involves co-operation with the Commission of the European Communities, ECE, FAO, OECD(NEA), UNEP, UNESCO, WHO and WMO.

[J.1] Staff members in the Waste Management Section of the Division of Nuclear Safety and Environmental Protection.

STRUCTURE

J.84. This sub-programme consists of three components which are described in the following paragraphs.

Waste management

Summary by programme components

Table J.5.

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Treatment and disposal of radioactive wastes	3.6	1.9	132 600	47 200	40 000	9 800	213 100
Nuclear energy and environmental impact	4.0	2.4	149 900	105 000	110 000	12 000	393 400
Decommissioning of nuclear facilities	0.7	0.7	28 100	6 000	-	800	34 900
Linguistic, printing and publishing services	-	-	-	-	-	148 000	148 000
TOTAL	8.3	5.0	310 600	158 200	150 000	170 600	789 400

Treatment and disposal of radioactive wastes

Objective

J.85. The objective is to review the management of wastes arising in the peaceful uses of nuclear energy, to ensure that waste management policies and practices are based on principles that guarantee long-term protection of the public and of the environment, to encourage the development of appropriate practices, and to review and disseminate the relevant information.

Results to date

J.86. This component was initiated in 1958. Methods for the treatment and disposal of low- and intermediate-level radioactive wastes have been reviewed and information on these methods has been made available to Member States. Eight guide-books have been published in the Safety Series and nine in the Technical Reports Series. Since 1965, the Agency has also published each year volumes of abstracts on waste management research.

J.87. Management policies and practices for high-level wastes vary from country to country because of different conditions, but there is need for harmonization of the principles on which policies and practices should be based. A central review of the policies and methods employed in the management of wastes from nuclear fuel reprocessing was made at a symposium in 1972, jointly organized by the Agency and OECD(NEA), of which the proceedings have been published. A Technical Report is being prepared for publication which reviews the management of high-level and alpha-bearing radioactive wastes. A panel meeting has been held to explore the feasibility of establishing international storage and disposal sites for these wastes, and to examine related technical problems. To meet one of the recommendations of this panel, a consultant has been engaged to assist the Agency in establishing criteria for the geological evaluation of sites suitable for the disposal of high-level and alpha-bearing wastes. A panel meeting was held in 1973 on selection of radioactive waste menagement systems for countries not engaged in nuclear fuel reprocessing and a guide-book is to be published in 1974.

J.88. A panel was convened in 1972 to prepare guidelines on the choice of burial conditions for radioactive waste concentrates. A follow-up panel to complete this task is being convened in 1974.

Plans for 1975-76

J.89. A symposium is planned for 1976 on the influence of design, process and operational considerations on minimizing radioactive waste quantities. A seminar is planned for 1976 on the management of high-level and alpha-bearing wastes, including considerations of a fast-breeder reactor strategy. A seminar is also planned for 1976 on the application of cost/risk/benefit analyses to the establishment of national and global waste management standards. This will include, among other considerations, those elements of particular relevance to matters of public understanding and acceptance of nuclear power programmes.

J.90. A working group established in 1974 to review and assess the technologies and practices in managing high-level and alpha-bearing wastes will continue its activities during 1975 and 1976 with one or more meetings planned for each year. A guide-book on the principles and practices in the management of high-level and alpha-bearing radioactive wastes will be prepared.

J.91. Because of the large number of developing Member States expected to embark on nuclear power programmes, additional guidance on waste management technology will be prepared by two advisory groups in 1975: first, guidelines on the management of radioactive wastes at nuclear power plants that would up-date and expand a manual prepared in 1968; secondly, guidelines on the safe storage, handling and on-site transportation of irradiated fuel and components at reactor plants, taking into account the extended periods of time over which such materials may be stored on site.

J.92. In view of the substantial increases foreseen in uranium and thorium production and of one of the recommendations of the United Nations Conference on the Human Environment held in Stockholm in June 1972, a code of practice covering waste management in the uranium and thorium mining and milling industry will be prepared. This will complete the Agency's safety guides for that part of the fuel cycle. The work is being initiated in 1974 and will be completed in 1975, when an advisory group meeting on the subject will be held.

Related activities

J.93. The related activities involve six to ten research contracts on the management of radioactive wastes, primarily those containing plutonium and other transuranic nuclides. Additional training courses on waste management will be organized subject to regional needs and the availability of funds.

Plans for 1977-80

J.94. Efforts will be made to find ways to provide guidance and other assistance on the selection and operation of waste management programmes and facilities appropriate to the individual needs of Member States, recognizing the special needs of those countries with developing nuclear power programmes.

J.95. As the number of fast-breeder reactors increases, they will have a growing impact on the types of radioactive wastes produced and, therefore, on waste management practices. The problem of the management of wastes arising from the use of fast-breeder reactors is expected to increase substantially after about 1990 and it is intended to devote considerable attention to this topic.

J.96. Attention will also be given to the management of tritium and radioactive noble gases associated with the operation of an increasing number of spent fuel reprocessing

plants. The possible substantial contribution to such gaseous wastes from an increasing number of high-temperature gas-cooled power reactors will also be considered.

J.97. Continuing efforts will be made to secure international co-operation in the harmonization of principles and the review of national policies of waste management. Two items will be of particular concern, namely the management systems that involve the release of radionuclides which may go beyond national boundaries and the management of wastes that require safe containment for long periods of time.

J.98. Consideration will be given to the waste management aspects of fusion power programmes. While it is not expected that fusion power will become a reality until after the year 2000, it is considered prudent to review any problems relating to the wastes produced in the fusion reactor process.

Co-operation with other organizations

J.99. This component involves co-operation with WHO, WMO, UNEP, CMEA and OECD(NEA) in regard to joint sponsorship of conferences, meetings and advisory groups, and in the publication of reports.

Nuclear energy and environmental impact

Objective

J.100. The main objective is to develop and elaborate recommended standards of safety concerning the releases of radionuclides and other contaminants from nuclear activities. In this connection, the aim is:

(a) The promotion and support of research which will provide information on the behaviour of radionuclides in the environment, including transfer through food and other ecological chains;

(b) The evaluation of the potential impacts on man and other sensitive organisms of ionizing radiation and radioactive materials arising from the increasing peaceful applications of nuclear energy, especially the production of electrical power; and

(c) The application of cost/risk/benefit analytical techniques to national and global waste management policies and practices.

Results to date

J.101. A symposium on the environmental behaviour of radionuclides released in the nuclear industry was held in 1973 in co-operation with WHO and OECD(NEA). It provided information on nuclides such as tritium, krypton and iodine, which, because of their environmental mobility or radioactive half-life, may go beyond national boundaries. Three books have been issued in the Safety Series and three in the Technical Reports Series.

J.102. A symposium on the physical behaviour of radioactive contaminants in the atmosphere was held late in 1973 in co-operation with WMO to provide up-to-date information on transport of radionuclides through the atmosphere.

J.103. A panel was convened late in 1972 to consider the environmental impact of thermal discharges from nuclear power plants. A symposium on the environmental impact of condenser cooling systems and thermal discharges at nuclear power stations was held in co-operation with ECE in 1974. A symposium on radioactive contamination of the marine environment was held in co-operation with the Monaco Laboratory in July 1972.

J.104. In late 1971 a panel was convened to consider the effects of ionizing radiation on aquatic organisms and ecosystems, followed by another panel in 1972 on the radiation effects on population dynamics in ecosystems, in particular, marine. A follow-up panel to the 1971 meeting was held in co-operation with UNEP in April 1974 to finalize a report on these subjects.

J.105. At the United Nations Conference on the Human Environment, held in Stockholm, special concern was expressed regarding international measures for control of marine pollution and the need to preserve the resources of the sea. In response to a resolution of the Stockholm Conference, an Intergovernmental Conference on the Convention on the Dumping of Wastes at Sea was held in London from 30 October to 13 November 1972. The Conference adopted a Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention), under which the Agency is given the responsibility to define criteria and standards for dealing with the question of sea disposal of radioactive wastes.

J.106. With a view to fulfilment by the Agency of its responsibilities under the Convention, a panel meeting was held in June 1973. The panel adopted a set of draft recommendations, which included a definition of high-level radioactive wastes or other high-level radioactive matter unsuitable for dumping at sea, and proposals for the environmental and ecological evaluation of dumping applications in accordance with the Convention as well as for the operational control of the dumping of radioactive wastes or other radioactive matter not prohibited by the Convention. A provisional set of draft recommendations, taking into consideration the recommendations of the panel and the comments of Member States, was prepared by the Secretariat in 1974.

J.107. An initial panel meeting was held in 1973 to discuss methods for estimating the capacity of the environment to accept radioactive materials. The results were reviewed at a consultants' meeting late in 1973, at which time a working paper was drafted for a second panel meeting scheduled for 1974. A panel meeting was held in 1973 to examine the problem of non-radioactive pollutants released from the nuclear industry and their impact on the environment.

Plans for 1975-76

J.108. As part of the programme on environmental contamination it is planned to convene symposia in 1975 on the following topics:

(a) Combined effects of radioactive, non-radioactive and thermal releases to the environment; and

(b) Environmental effects of releases from nuclear facilities into aquatic environments.

J.109. It is also planned to convene advisory groups in 1975 to discuss the following topics:

(a) Methodology for assessment by systems analysis of the relative significance of releases from waste discharges and disposals, on a regional and global basis;

(b) Environmental impacts of the nuclear power industry, taking into account the typical waste production and environmental disturbances associated with each phase of the nuclear power cycle; and

(c) Application of cost/risk/benefit analyses of environmental impacts of nuclear programmes and their relation to waste management standards.

J.110. The programme dealing with the impact of the nuclear power industry on the environment and with the methodology to assess the capacity of the environment in that

respect will be accelerated, and a seminar on that methodology and its application, primarily for developing countries, will be held in 1976. Further it is proposed to convene, in 1976, an advisory group on assessment of radioactive, non-radioactive and thermal discharges and disposals from nuclear industry on a regional and global basis.

J.111. An advisory group will be convened in early 1975 to review and revise the provisional recommendations referred to in paragraph J.106 above in the light of all comments received from Member States at that time.

J.112. The behaviour of radionuclides released to the marine environment was first reviewed in 1958 and a report entitled "Radioactive Waste Disposal into the Sea" (Safety Series No. 5) was published in 1961; in 1970, a panel prepared a draft report on principles for limiting discharges of radioactive wastes into the sea. However, in the light of discussions at the Stockholm Conference on the Human Environment and the responsibilities entrusted to the Agency under the London Convention of 1972, the up-dating of these reports in the near future is considered necessary. In order to cope with the rapidly developing situation, it is proposed to convene an advisory group in 1975 to review, up-date and consolidate the guidance now provided on disposal of radioactive wastes into the sea.

J.113. A technical committee on international registries of radionuclide releases, storage and disposals will be established in 1975; meetings will be held in 1975 and 1976 to develop a recommended programme for this Agency activity. It is also proposed to convene an advisory group in 1976 to consider environmental capacity [J.2] and its relationship to national waste management programmes.

Related activities

J.114. The related activities involve four research contracts under a co-ordinated programme on integrated waste management systems and their impact on the environment and five contracts to study migration and dispersion of radionuclides from the storage of radioactive wastes. Work is also in progress under nine contracts on the environmental behaviour of tritium. A co-ordinated research programme initiated in 1973 on the physical and biological effects on the environment of cooling systems and thermal discharges from nuclear power plants will be expanded in 1974 and continued in 1975.

J.115. Subject to the availability of funds, a study tour of 4-6 weeks' duration in the Czechoslovak Socialist Republic, the Federal Republic of Germany, the German Democratic Republic and the Soviet Union is proposed for 1976 to cover the broad field of nuclear safety and environmental protection. The attendance would be interregional, comprising about 30 selected participants from those developing countries that have operational or planned nuclear power programmes or substantial research and isotope production reactor programmes.

Plans for 1977-80

J.116. About 10 to 15 research contracts are expected to be awarded each year. Guidance will be prepared on the use of ecological systems analysis in assessing potential impacts on man and the environment of waste management and effluent releases from the nuclear industry.

J.117. Increased efforts will be devoted to the assessment of environmental impacts on a local, regional and global basis as a result of nuclear activities, especially from those activities associated with the increased production of electrical power by nuclear means.

[J.2] The term "environmental capacity" means the amount of radioactivity that can be received by the environment through waste discharges and disposals without resulting in doses to man in excess of the dose limits,

Special attention will be given to the individual needs of Member States according to their developing nuclear programmes. Attention will also be given to application of the methodology of environmental impact assessment by Member States and the application of cost/risk/benefit systems analyses to the establishment of waste management guidelines.

J.118. The work, developed in co-operation with WHO and UNEP, on registries of the radioactive releases, storage and disposals from the nuclear industry will proceed.

J.119. The review and implementation of the recommendations made under the London Convention with regard to prevention of marine pollution will continue, with consultative meetings at least every two years.

Co-operation with other organizations

J.120. Consultations on the work programme are held with FAO, OECD(NEA), UNESCO, WHO, WMO, ECE, UNEP and the Commission of the European Communities.

Decommissioning of nuclear facilities

Objective

J.121. The objective is to review the needs of the expanding nuclear power industry, to co-ordinate activities and promote the formulation of guides, recommendations and criteria for the decommissioning of nuclear facilities.

Results to date

J.122. This component was initiated in 1973 at a consultants' meeting convened to review the role the Agency should play in providing guidance on this matter.

Plans for 1975-76

J.123. It is planned to establish a technical committee in 1975 to co-ordinate activities and promote the formulation of guides, recommendations and criteria; it is proposed to hold meetings in 1975 and 1976. A symposium on all aspects of the decommissioning of nuclear facilities is planned for 1976, with special emphasis on criteria for decommissioning, requirements to be considered in design for ease of decommissioning, economic aspects and regulatory aspects. It is envisaged that the Division of Nuclear Power and Reactors will be involved in some aspects of the above activities.

Plans for 1977-80

J.124. The activities of the technical committee will continue. It is proposed to convene advisory groups to deal with particular topics which have been identified by the technical committee as requiring a broader range of expertise. Guidance will be developed for use by designers to permit simpler and more economical decommissioning.

Co-operation with other organizations

J.125. This component involves co-operation with OECD(NEA) and ECE.

Nuclear safety

OBJECTIVE

J.126. The objective is to provide Member States with advice and assistance for the safe siting, design, construction and operation of research reactors, nuclear power plants,

and plants storing and processing nuclear materials, as well as with advice on licensing procedures and compliance controls. This objective will be pursued simultaneously through advisory missions, the progressive establishment of a coherent and comprehensive set of internationally acceptable safety criteria and guides, the exchange of information and training.

RESULTS TO DATE

J.127. This sub-programme was initiated in 1960. Forty-eight advisory missions on the safe siting, design and construction of research reactors, nuclear power plants and other nuclear installations, as well as one advisory mission on the acceptance of a nuclear ship for entry into a specific harbour, have been organized.

J.128. Twelve panel meetings have resulted in nine publications in the Safety Series and Technical Reports Series on various facets of reactor safety. Of these, two codes of practice, prepared in co-operation with WHO, were promulgated under the authority of the Board of Governors as part of the Agency's Safety Standards, namely the "Code of Practice for the Safe Operation of Nuclear Power Plants" (Safety Series No. 31) and the "Code of Practice for the Safe Operation of Critical Assemblies and Research Reactors" (Safety Series No. 35). A code on design and safety criteria for safe reactor design and construction is in preparation.

J.129. Six symposia on siting and other safety aspects of nuclear reactors have been organized. General information on reactor safety was given in the training courses mentioned in the sub-programme on radiological safety; in addition, one travelling seminar was organized specifically on the subject of research reactor safety.

PLANS FOR 1975-76

J.130. Many of the countries which can now be expected to embark on nuclear power programmes do not have the legislative and other regulatory provisions for laying down safety criteria and reviewing the safety of nuclear power projects, and they lack qualified manpower to carry out these functions. Experience has shown that the advice provided by the Agency on siting and safety reviews during the design, construction and operational stages of a project has been of great importance. It is therefore to be expected that the requests for advisory services and for safety assessments will lead to a considerable increase in the Agency's work.

J.131. At the same time the general increase in international orders for nuclear power plants will stress the problems inherent in the lack of internationally accepted codes and guides to ensure the safety and reliability of such plants with regard to their siting, design, construction and operation. In particular it is important for the Agency to have a standard frame of reference for the safety assessments requested by Member States as required under nuclear power project agreements.

J.132. The exchange of information through symposia and seminars will continue to be necessary in certain fields. Efforts will also be intensified to assist Member States embarking upon nuclear programmes to cope by themselves with reactor safety matters, in particular through proper training and guidance on regulatory programmes and operational safety.

J.133. It is expected that the expansion of the programme outlined above will necessitate a minimum increase in the manning table foreseen for 1975 of four P-5 posts and two P-4 posts, bringing the total Professional staff engaged in work on nuclear safety in 1975 to ten [J.3]; two additional GS posts will also be required. Broadly speaking, six of the

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[J.3] Staff members in the Nuclear Safety Section of the Division of Nuclear Safety and Environmental Protection.

Professional staff members will deal mainly with advisory missions and safety assessments of nuclear power projects, while the other four will be mainly engaged in carrying out the accelerated programme on standards for power reactors. In addition, increases in the number of meetings required, the use of consultants, travel, printing and so on will be entailed.

PLANS FOR 1977-80

J.134. The work will continue along the lines indicated above, adjustments being made when necessary in the light of experience and new needs and priorities.

RELATED ACTIVITIES

J.135. Nuclear safety is part of the overall programme of the Division on risk evaluation. The nuclear safety sub-programme involves training courses and other technical assistance services, the provision of advisory services and the application of the Agency's safety standards to Agency-assisted projects.

CO-OPERATION WITH OTHER ORGANIZATIONS

J.136. This sub-programme involves co-operation with WHO in regard to the sponsoring of codes of practice and participation in safety missions, and with OECD(NEA) and the Commission of the European Communities with respect to the harmonization of activities. Liaison is maintained with UNESCO on safety problems relating to earthquakes.

STRUCTURE

J.137. This sub-programme consists of three components which are described in the following paragraphs.

Nuclear safety

Summary by programme components

Table J.6

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Advisory missions and safety evaluations of nuclear reactors including nuclear merchant ships	4.0	2.0	123 000	-	-	40 000	163 000
Standards for nuclear safety	4.2	2.0	215 000	75 000	-	5 400	295 400
Exchange of information and training	2.1	1.5	66 600	30 000	-	18 100	114 700
Linguistic, printing and publishing services	-	-	-	-	-	94 000	94 000
TOTAL	10.3	5.5	404 600	105 000	-	157 500	667 100

Advisory missions and safety evaluations of nuclear reactors including nuclear merchant ships

Objective

J.138. The objective is to advise and assist Member States in regard to criteria, standards, codes of practice and guides for the safe siting, design, construction and operation of nuclear reactors and on regulatory requirements, including safety assessment, quality assurance, construction permits, licensing, and compliance therewith.

Results to date

J.139. Safety assessments of research reactors have been made since 1960 and advice has been provided on the safety levels achieved at nuclear centres. Safety assessments of nuclear power plants have been made at either the pre-construction or construction phase. Since 1963 twelve countries have been assisted in the selection of sites for nuclear plants. A number of Agency projects have been evaluated from the nuclear safety point of view before submission to the Board for approval in accordance with statutory requirements.

Plans for 1975-76

J.140. It is expected that requests from Member States for the provision of advice to the authorities concerned with licensing nuclear power plants on the safety aspects of site selection, the safety assessment of the plants and the safety aspects of the technical specifications set forth in bids for the provision of nuclear power plants will continue to increase. The number of assessments required under nuclear power project agreements is also expected to increase. To meet that demand the recruitment of more reactor safety specialists as staff members, together with the mobilization of available means within the Agency on an ad hoc task force basis where appropriate, will be required. At the same time, efforts will be continued to discourage the submission of requests for assistance at short notice and to expand the roster of experts in various fields, bearing in mind the necessity to ensure continuity in the provision of advice.

Plans for 1977-80

J.141. During 1977-80 it is expected that requests for advice will increase considerably at the pre-construction, construction and operation stage of nuclear plants. Consideration will also be given to the safety assessments of advanced types of nuclear power plants. The safety assessments required under project agreements will require more effort owing to the increasing number of projects concerning nuclear power plants. Nuclear safety inspection and advisory missions will be sent to selected groups of Member States on a regional basis for the provision of assistance and in order to certify observance of the terms of the project agreements.

Standards for nuclear safety

Objective

J.142. The objective is to provide terms of reference and/or guidance in regard to all safety aspects of nuclear reactors and in particular nuclear power plants.

Results to date

J.143. In addition to the codes of practice mentioned in paragraph J.128 above, a manual entitled "Application of Meteorology to Safety at Nuclear Plants" (Safety Series No. 29) and a report entitled "Aseismic Design and Testing of Nuclear Facilities" (Technical Report No. 88) have been published. A manual entitled "Safety Considerations in the Use of Ports and Approaches by Nuclear Merchant Ships" (Safety Series No. 27) has been published on

behalf of the Agency and IMCO. A manual entitled "Earthquake Guidelines for Reactor Siting" (Technical Report No. 139) provides guidance on the siting of nuclear power plants in seismic areas. Guidelines for the Layout and Contents of Safety Reports for Stationary Nuclear Power Plants were issued in 1970 (Safety Series No. 34), and in 1974 Guidelines for the Organization of Regulatory Activities for Nuclear Reactors were produced (Technical Report No. 153).

Plans for 1975-76

J.144. In view of the expected increase in nuclear power capacity, it has become necessary for the Agency to accelerate the work on codes and guides for nuclear safety which had been foreseen for the period 1975-80, and to collate and develop recommendations, as far as possible and necessary, for the safety of nuclear power plants, together with the reliability requirements directly related to safety, which would serve as a standard frame of reference for analysing nuclear plant safety and reliability; these recommendations will be supplemented, to the extent possible, by detailed guidance for their practical implementation. This work should be started as soon as possible and be completed quickly if the results are to be available when they will be most needed. A tentative plan of action has been prepared by the Secretariat; its first phase involves the production over two years of a set of documents, the extent of which will depend upon resources available, which will cover the essential aspects of governmental organization, siting, design, operation and quality assurance of nuclear power plants. The publications referred to in paragraphs J.128 and J.143 above will be revised if necessary and form a part of this overall programme.

Plans for 1977-80

J.145. The work will continue as appropriate in the light of the achievements in 1975-76.

Exchange of information and training

Objective

J.146. The objective is to develop knowledge and understanding of the various approaches and practices followed in regard to nuclear safety and to assist Member States in applying the available information in dealing with concrete problems.

Results to date

J.147. A symposium was held on reactor safety and hazards evaluation techniques in 1962, on the siting of reactors and nuclear research centres, in 1963, on containment and siting of nuclear power plants in 1967 and on principles and standards of reactor safety in 1973. A symposium on siting of nuclear power plants is being held in 1974 in co-sponsorship with OECD(NEA).

Plans for 1975-76

J.148. A symposium on technology and safety of advanced and high-temperature gas-cooled reactors will be held in 1975, and it is proposed to hold a symposium on the safety aspect of fast reactors in 1976. In addition to the comprehensive training programme referred to in paragraph C.23 above and subject to the availability of funds a training course on regulatory requirements in connection with nuclear plant safety, which would present the various technical facets essential to the development of adequate national regulations, will be organized in 1975 for Member States in South East Asia and the Far East (this course will be repeated in 1976 for countries in the Mediterranean, European and Middle East region) and an interregional study tour of 4-6 weeks' duration in the Czechoslovak Socialist Republic, the Federal Republic of Germany, the German Democratic Republic and the Soviet Union will be organized in 1976 to cover the broad

field of nuclear safety and environmental protection for senior officials from national regulatory bodies and from reactor establishments or electrical generating utilities.

Plans for 1977-80

J.149. Symposia may be held on the safety aspects of nuclear plants of advanced designs, on off-shore siting and on recent developments relating to the safety of nuclear merchant ships. It is proposed to hold seminars on safe practices in nuclear plant siting on a regional basis. Subject to the availability of funds, the training course mentioned in the preceding paragraph will be repeated for Member States in the Latin American region.

The use of nuclear explosions for peaceful purposes

OBJECTIVE

J.150. The objective of this sub-programme is to study and report, provide information and advice on the uses of peaceful nuclear explosions (PNE) and to study ways and means of establishing an international service for nuclear explosions for peaceful purposes under appropriate international control.

RESULTS TO DATE

J.151. This sub-programme was initiated in 1967 and many of the earlier activities were organized jointly within the programme "Nuclear power and reactors" and the programme "Nuclear safety and environmental protection". Since 1973 responsibility for all aspects of the sub-programme rests within the programme "Nuclear safety and environmental protection". Three technical meetings have been held on the phenomenology and practical aspects of peaceful nuclear explosions, at which the present status of the technology was reviewed and further subjects of interest to Member States, which should be taken up by the Agency as part of its role in the dissemination of information, were recommended. The proceedings of the first two technical meetings have been issued in the Panel Proceedings Series, and the proceedings of the third will be issued in mid-1974. An additional meeting has dealt with appropriate international observation by the Agency of PNE. A bibliography on PNE was published in 1970. A working group was convened in April 1974 to recommend procedures for the Agency to follow in responding to requests for PNE services, and a fourth technical meeting on PNE may be held in late 1974 or early 1975.

PLANS FOR 1975-76

J.152. During this period the Agency's activities will be mainly directed towards continuing technical information exchange at a rate dictated by the pace of new developments in this field. Depending on the rate of development of the technology, a fifth technical meeting (advisory group) on PNE may be held in late 1976.

PLANS FOR 1977-80

J.153. The Agency's activities in this period will depend upon the developments that take place in the relevant technologies and on the interest shown by Member States in PNE projects.

CO-OPERATION WITH OTHER ORGANIZATIONS

J.154. This sub-programme involves co-operation with WHO concerning the radiological protection of the public and the environment.

The use of nuclear explosives for peaceful purposes

Table J.7

Programme component	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
The use of nuclear explosives for peaceful purposes	0.6	.2	21 800	-	-	500	22 300
TOTAL	0.6	.2	21 800	-	-	500	22 300

K. INTERNATIONAL LABORATORY OF MARINE RADIOACTIVITY

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table K.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	233 788	257 000	35 000	12 000	47 000	304 000	335 000
Consultants	1 871	3 400	200	600	800	4 200	4 500
Temporary assistance	774	-	-	-	-	-	-
Sub-total	236 433	260 400	35 200	12 600	47 800	308 200	339 500
Common staff costs	76 363	82 900	12 000	4 000	16 000	98 900	108 200
Travel	4 422	4 000	200	(200)	-	4 000	4 300
Meetings							
Technical committees, advisory groups	4 259	-	-	-	-	-	-
Representation and hospitality	141	300	100	500	600	900	1 000
Scientific supplies and equipment	39 461	25 000	3 000	7 000	10 000	35 000	38 000
Common services, supplies and equipment	16 083	11 400	1 300	2 300	3 600	15 000	19 000
TOTAL	377 162	384 000	51 800 13.5%	26 200 6.8%	78 000 20.3%	462 000	510 000
Source of funds:							
Regular Budget	313 763	329 000	41 800 12.7%	21 200 6.4%	63 000 19.1%	392 000	440 000
Operating Fund I	63 399	55 000	10 000	5 000	15 000	70 000	70 000
TOTAL	377 162	384 000	51 800 13.5%	26 200 6.8%	78 000 20.3%	462 000	510 000

SUMMARY OF MANPOWER

Table K.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
P-5	1	1	1	-	1	1
P-4	3	3	3	-	3	3
P-3	-	1	1	-	1	1
P-1	2	3	3	-	3	3
Sub-total	6	8	8	-	8	8
GS	12	11	11	2	13	13
M&O	-	-	-	-	-	-
TOTAL	18	19	19	2	21	21

CHANGES IN COSTS AND MANPOWER

Costs

K.1. It is expected that the cost of this programme will increase in 1975 by $78 000, of which $51 800 will be required to cover salary and other price increases and $26 200 will be a programme increase. Of the programme increase the amount of $16 000 for salaries and related common staff costs will be required for two additional GS posts.

K.2. Of the total increase of $78 000, an amount of $63 000 will have to be financed from the Regular Budget and $15 000 from the Operational Budget. In addition to the contribution from the Monegasque Government, $5000 will again be contributed by UNESCO under a contractual arrangement, and the balance will be covered by miscellaneous income.

Manpower

K.3. As can be seen from Table K.2 above, two additional GS posts will be required, one for a secretary and one for an electronics technician, to cope with the increasing work load.

THE PROGRAMME

OBJECTIVE

K.4. The objective is to promote the intercomparability of radioactivity measurements made in national laboratories and institutes for marine radioactivity studies, to develop reference analytical methods and techniques for investigating the behaviour of radioactivity in the oceans and to obtain the scientific information needed to assess the impact of waste disposal and nuclear power generation on the marine environment.

RESULTS TO DATE

K.5. Since the completion of the first intercomparison-intercalibration exercise on labelled sea-water in 1971, samples of seaweed, mussels and sediment have been distributed to 60 participating institutions in 30 countries. Although the samples were similar, there continued to be a discrepancy in the results of the measurements of certain radionuclides, principally ruthenium-106, made by participating laboratories. Two panels have been held, one dealing with methods of analysis for ruthenium and plutonium radionuclides in marine samples and one dealing with the design of marine radioecological experiments. Equipment acquired in 1973 made it possible to measure transuranic radioelements, trace metals and organochlorine compounds.

PLANS FOR 1975-80

K.6. The intercomparison-intercalibration programme in radioactivity measurements will be continued, but samples will be distributed less frequently. Recommended procedures will be elaborated for those radionuclides whose measurement, as shown by the intercomparison exercise, is particularly difficult. Work will continue on the biogeochemical behaviour of transuranic elements in saline and fresh waters and on problems relating to the use of biocides in nuclear power plants.

RELATED ACTIVITIES

K.7. The related activities involve research and technical contracts and periodic marine research co-ordination meetings.

CO-OPERATION WITH OTHER ORGANIZATIONS

K.8. The Laboratory's programme involves co-operation with UNESCO in matters relating to financial support. It is expected that financial support will also be provided by UNEP.

STRUCTURE

K.9. This programme consists of three sub-programmes which are dealt with separately below.

Summary of manpower and costs

Table K.3

Sub-programme	1975 Costs					1976 Preliminary estimate		
	Man-years P	Man-years GS	Staff	Other	Total	Man-years P	Man-years GS	Costs
Radiochemistry	2.5	5.0	187 500	18 000	205 500	2.5	5.0	227 000
Radiosedimentology	3.0	3.0	113 000	19 900	132 900	3.0	3.0	146 500
Radiobiology	2.5	5.0	106 600	17 000	123 600	2.5	5.0	136 500
TOTAL	8.0	13.0	407 100	54 900	462 000	8.0	13.0	510 000

Radiochemistry

OBJECTIVE

K.10. The objective is to ensure the comparability of radioactivity measurements made by national laboratories, and to develop reference analytical methods for radionuclide determinations in marine samples. This activity is being carried out in collaboration with the Agency's Laboratory at Seibersdorf.

RESULTS TO DATE

K.11. The distribution of marine samples containing fission products and transuranium radionuclides has been completed. Results of sea-water, seaweed and sediment analysis have been summarized and published. There continues to be a wide variation in the reported values for certain radionuclides, such as ruthenium-106 and caesium-137. Preliminary results from a limited number of participating institutions indicate good comparability in the determination of plutonium in marine sediments.

K.12. The Monaco Laboratory participated in a panel on reference methods for marine radioactivity studies, which dealt with methods for analysing ruthenium and plutonium radionuclides.

PLANS FOR 1975-76

K.13. The radionuclide intercomparison programme will be continued, but samples will be distributed less frequently; it is now envisaged that a limited number of samples will be

distributed every two years. The study of the behaviour of transuranic elements in the marine environment will continue.

PLANS FOR 1977-80

K.14. Emphasis will be placed on the elaboration of recommended measurement procedures to be used in monitoring operations. The preparation of reference materials for analytical quality control will continue.

Radiosedimentology

OBJECTIVE

K.15. The objective is to determine the influence of sea-water sediment interactions on the distribution of radionuclides in the marine environment, and to investigate the formation and persistence of organochlorine compounds resulting from chlorine treatment of reactor cooling waters.

RESULTS TO DATE

K.16. The major objectives of this sub-programme were achieved in mid-1973, and the conclusions reached are summarized in the proceedings of the Agency's symposium on "Radioactive Contamination of the Marine Environment" [K.1] and in the publication of the United States National Academy of Sciences entitled "Radioactivity in the Marine Environment". The experimental techniques developed for the study of fission activation products are now being applied to transuranic elements.

K.17. The study of biocides in reactor cooling waters has required new equipment and the attendant problems of installation and calibration have had to be solved. Techniques have now been developed which make it possible to determine mono- and dichloramines by amperometric titration and to begin investigations on more complex organochlorine compounds using gas chromatographic techniques.

PLANS FOR 1975-76

K.18. Further evaluation of the interactions of transuranic radionuclides with sediments will be carried out. Work will be continued on identifying organochlorine compounds formed when chlorine reacts with naturally occurring organic matter.

PLANS FOR 1977-80

K.19. In co-operation with the Biology Section, the effects of biocides on selected marine organisms will be investigated.

Radiobiology

OBJECTIVE

K.20. The objective is to develop and evaluate methods for assessing the importance of biological processes in the transport of radionuclides and trace metals in the ocean, and to

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[K.1] STI/PUB/313.

investigate the biological effects of non-radioactive constituents of reactor cooling waters on aquatic biota.

RESULTS TO DATE

K.21. Experiments have been concluded on the biological uptake of cerium-144, cadmium-109, silver-110m, zinc-65 and plutonium-239, 240, by benthic worms. Of these isotopes, only zinc-65 was accumulated to any measurable extent. Zooplankton and other microcrustaceans have shown a marked tendency to absorb or assimilate cerium-144, cadmium-109 and zinc-65 and thereby contribute to the vertical transport of these nuclides in the ocean.

PLANS FOR 1975-76

K.22. The previous two components of this sub-programme have been reorganized to focus investigations on zooplankton transport of activation products, trace elements and alpha-emitting radionuclides.

PLANS FOR 1977-80

K.23. Studies will be continued which deal with the biological transport of trace metals, activation products and alpha-emitting radionuclides. In addition, work will begin on determining the effects of biocides on selected marine organisms.

L. INFORMATION AND TECHNICAL SERVICES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table L.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	795 491	958 500	101 400	32 100	133 500	1 092 000	1 231 000
Consultants	3 719	9 000	500	-	500	9 500	10 500
Overtime	11 457	7 600	900	2 500	3 400	11 000	13 100
Temporary assistance	12 652	11 100	1 300	6 100	7 400	18 500	19 400
Sub-total	823 319	986 200	104 100	40 700	144 800	1 131 000	1 274 000
Common staff costs	259 836	308 500	34 500	11 000	45 500	354 000	396 600
Travel	11 339	20 500	1 100	(500)	600	21 100	22 200
Meetings							
Conferences, symposia, seminars	5 457	9 000	500	(1 500)	(1 000)	8 000	8 000
Technical committees, advisory groups	16 131	22 000	2 500	-	2 500	24 500	25 000
Representation and hospitality	1 564	1 500	200	-	200	1 700	1 700
Scientific and technical contracts	22 817	53 300	1 500	(5 800)	(4 300)	49 000	51 500
Common services, supplies and equipment	874 505	724 000	24 000	280 700	304 700	1 028 700	1 095 000
Other items of expenditure							
Linguistic services	87 876	94 000	12 000	-	12 000	106 000	116 000
Printing and publishing services	194 742	242 000	50 000	21 000	71 000	313 000	334 000
Sub-total	2 297 586	2 461 000	230 400 9.4%	345 600 14.0%	576 000 23.4%	3 037 000	3 324 000
Less:							
Amount transferred to Safeguards	29 151	34 000	2 000	4 000	6 000	40 000	69 000
TOTAL	2 268 435	2 427 000	228 400 9.4%	341 600 14.1%	570 000 23.5%	2 997 000	3 255 000

SUMMARY OF MANPOWER

Table L.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	2	3	3	-	3	3
P-4	8	8	8	1	9	9
P-3	7	7	7	-	7	8
P-2	7	7	7	-	7	7
P-1	7	7	7	(1)	6	4
Sub-total	32	33	33	-	33	32
GS	58	62	62	4	66	69
M&O	1	1	1	-	1	1
TOTAL	91	96	96	4	100	102

CHANGES IN COSTS AND MANPOWER

Costs

L. 1. As will be seen from Table L. 1 above, the estimates for 1975 provide for an increase of $576 000, of which $230 400 represents salary and other price increases and $345 600 a programme increase.

L. 2. Of the programme increase, $43 000 is for additional staff and $8600 for overtime and temporary assistance. The greater part of the programme increase is for common services, supplies and equipment. The expansion of INIS activities will require an additional amount of $125 000 for supplies and services. It is expected that the income from the sale of INIS publications will increase by at least $10 000.

L. 3. In respect of the computer service it is planned to rent two additional disc drives in 1975, to enlarge the memory of the central processing unit by 128K and to increase the efficiency of the computer service by adding several terminals. The total programme increase of $155 700 for this service is expected to be more than offset by additional income of $124 000 from services provided to UNIDO and income of $80 000 for services to be provided to FAO in operating an Agricultural Information System.

L. 4. In order to show the total cost of safeguards, the cost of the computer services provided is transferred to the Safeguards programme, as shown in Table 1 above.

Manpower

L. 5. As will be seen from Table L. 2 above, the upgrading of a vacant P-1 post to the P-4 level for use in the computer services and the addition of four GS posts are foreseen for 1975. Two of the GS posts will be needed to cope with the increased work load resulting from the expansion in INIS activities, one for key punching in the Computer Section and the remaining one for the provision of assistance to the editor of the Agency's two scientific journals (Nuclear Fusion and Atomic Energy Review).

L. 6. For 1976 it is planned to substitute a P-3 post for two P-1 posts for which recruitment has proved difficult, and to add three GS posts.

Summary of total costs by organization unit

Table L. 3

Organization unit	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Office of the Director	334 562	379 500	63 400	10 800	74 200	453 700	480 000
INIS Section	632 945	683 200	72 700	154 200	226 900	910 100	983 000
Computer Section	1 057 302	1 106 700	70 000	180 800	250 800	1 357 500	1 514 000
Library	272 777	291 600	24 300	(200)	24 100	315 700	347 000
Sub-total	2 297 586	2 461 000	230 400	345 600	576 000	3 037 000	3 324 000
Less:							
Amount transferred to Safeguards	29 151	34 000	2 000	4 000	6 000	40 000	69 000
TOTAL	2 268 435	2 427 000	228 400	341 600	570 000	2 997 000	3 255 000

Summary of manpower by organization unit and category

Table L. 4

Organization unit	1973 Adjusted budget				1974 Adjusted budget				1975 Estimate				1976 Preliminary estimates			
	P	GS	M&O	Total	P	GS	M&O	Total	P	GS	M&O	Total	P	GS	M&O	Total
Office of the Director	2	2	-	4	2	2	-	4	2	3	-	5	2	3	-	5
INIS Section	14	17	-	31	14	19	-	33	14	21	-	35	14	21	-	35
Computer Section	11	28	-	39	12	30	-	42	12	31	-	43	12	34	-	46
Library	5	11	1	17	5	11	1	17	5	11	1	17	4	11	1	16
TOTAL	32	58	1	91	33	62	1	96	33	66	1	100	32	69	1	102

Cost of INIS activities

Table L. 5

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	1975 Estimate	1976 Preliminary estimate
Salaries and wages				
Established posts	319 934	349 000	396 200	436 000
Consultants	3 719	5 500	6 500	7 000
Overtime	19	600	600	600
Temporary assistance	11 994	4 500	9 500	10 400
Sub-total	335 666	359 600	412 800	454 000
Common staff costs	104 502	112 400	128 400	140 400
Travel	7 151	9 200	9 200	9 400
Meetings				
Conferences, symposia, seminars	5 457	9 000	8 000	8 000
Technical committees, advisory groups	16 131	22 000	24 500	25 000
Representation and hospitality	1 325	1 000	1 200	1 200
Scientific and technical contracts	6 865	30 000	33 000	35 000
Scientific supplies and equipment	-	-	-	-
Common services, supplies and equipment	115 660	85 000	218 000	220 000
Other items of expenditure				
Linguistic services	-	-	-	-
Printing and publishing services	40 188	55 000	75 000	90 000
Other	-	-	-	-
TOTAL	632 945	683 200	910 100	983 000

Computer Section: Breakdown of costs by programme

Table L. 6

Programme	1973 Actual obligations	1974 Adjusted budget	1975 Estimate	1976 Preliminary estimate
Technical assistance	1 870	4 000	3 000	3 000
Food and agriculture	18 682	22 000	24 000	30 000
Life sciences	9 586	16 000	17 000	20 000
Physical sciences	59 087	71 000	80 000	90 000
The Laboratory	4 083	6 000	6 000	7 000
Nuclear power and reactors	72 689 a/	44 000	49 000	55 000
Information and technical services	300 138 b/	343 000	379 500	400 000
Safeguards	29 151	34 000	40 000	69 000
Administration	300 175	315 000	300 000	320 000
General services	27 921	31 700	35 000	40 000
Reimbursable services	233 920	220 000	424 000	480 000
TOTAL	1 057 302	1 106 700	1 357 500	1 514 000

a/ Includes $58 369 for Nuclear Power Market Survey Project.
b/ Includes about $230 000 for INIS.

THE PROGRAMME

OBJECTIVE

L. 7. The objective is to foster the exchange of scientific and technical information on peaceful uses of atomic energy. The Division of Scientific and Technical Information pursues this objective by assembling such information and disseminating it to scientific bodies in Member States, interested international organizations, the Agency's staff, etc. The Division's main functions consist of:

(a) Planning and managing INIS so that it is

(i) Responsive to the information needs of all Member States,

(ii) In harmony with national and other international information systems,

(iii) Economical compared to other means of providing similar services,

(iv) Capable of meeting new needs and taking advantage of technological innovations, and

(v) Constructive in the sense of supporting the development of strong national and regional infrastructures in the information field and promoting the interconnection and compatibility of information systems;

(b) Providing efficient computer services in support of technical information, management and various other activities of the Agency and UNIDO;

(c) Providing efficient library services for the Agency and - to a more limited extent - for Member States and organizing the exchange of specialized scientific and technical information with other international bodies; and

(d) Managing the Agency's two scientific journals - Nuclear Fusion and Atomic Energy Review.

RESULTS TO DATE

L. 8. Since it was conceived in 1966, INIS has progressed through the system design, experimental operation and training stages to full-scale operation (57 000 items processed in 1973). The machine capacity in the Computer Section has increased and more sophisticated applications have become possible. The manpower requirements in the Library have been reduced through mechanization, without any deterioration in the services provided or in standards. Efforts have continued to improve Nuclear Fusion and Atomic Energy Review and thus to increase their acceptance by the world's nuclear community.

PLANS FOR 1975-80

L. 9. INIS will continue to operate at full scope, each issue of ATOMINDEX being accompanied by a subject index and a cumulative index being published twice yearly. INIS will begin to handle abstracts in machine-readable form if this is considered feasible in the light of experimental operating experience and is recommended by the INIS Advisory Committee, which will be meeting late in 1974 to prepare a comprehensive report on the functioning of INIS during the period 1972-74. Computer hardware will be brought into better balance in order to achieve greater throughput. By the end of the period, the computer memory will probably have been upgraded to 1024K bytes, while the jobs handled will be of the computational rather than the input/output type.

L. 10. The range of topics covered in Atomic Energy Review, which will continue to appear quarterly, is to be extended to reflect increasing interest in certain scientific and technical fields. Special issues will continue to be published; it is planned to complete the first series of special issues - that on "Thermodynamic Properties of Nuclear Elements and their Compounds" - by the end of 1975.

L. 11. With the growing confidence that power generation by controlled thermonuclear fusion will ultimately be achieved, Nuclear Fusion will continue to appear six times a year. Consideration will be given to a recommendation of the International Fusion Research Council that the "World Survey of Major Facilities in Controlled Fusion Research", which has appeared twice (in 1970 and 1973) as a special supplement to Nuclear Fusion, be published once every three years. English translations of Russian-language papers presented at the Agency's conferences on plasma physics and controlled thermonuclear fusion research will continue to be published in supplements to Nuclear Fusion, which is expected to continue as the only international journal covering both plasma physics and fusion reactor engineering.

RELATED ACTIVITIES

L. 12. The related activities consist of the provision of advisory services in connection with INIS, the formulation - in collaboration with other international organizations - of common standards for application in the information field, the training of personnel participating in INIS (including the training of a limited number of fellows in the INIS Section and the training of a limited number of fellows in the Library and the Computer Section.

CO-OPERATION WITH OTHER ORGANIZATIONS

L. 13. The programme involves co-operation with UNESCO, FAO, UNIDO, EURATOM, the inputting centres of Member States and of other international organizations, IIASA, the libraries of other organizations in the United Nations family and computer centres in developing countries.

STRUCTURE

L. 14. This programme consists of three sub-programmes, which are dealt with separately below.

SUB-PROGRAMMES

INIS

OBJECTIVE

L. 15. The objective is to plan and operate, in collaboration with Member States, a comprehensive and efficient nuclear information service on the basis of the centralized merging by the Agency, using up-to-date computer techniques, of decentralized input from Member States to provide national information centres with reliable output in a variety of forms for "re-packaging" and transmission to the individual user.

RESULTS TO DATE

L. 16. With the achievement of full-scope operation, INIS processed 57 000 items in 1973 - three times as many as in 1972; in addition, each issue of ATOMINDEX carried a subject index. The Agency also produced for FAO, on a cost-reimbursable basis, an experimental index for agriculture, thereby demonstrating that the INIS software can be used in other subject areas. Eleven international organizations and 43 Agency Member States are now participating in INIS.

L. 17. In this context it may be appropriate to mention that INIS is expected to be processing about 65 000 items by the end of 1974, by which time Member States will have thoroughly evaluated the subject index, in both its printed and its magnetic tape form, and the experimental inclusion of abstracts in INIS (through the use of devices such as optical character-recognition machines) will have been studied. Moreover, it is hoped that by the end of this year the Agency will be able to provide (in co-operation with other organizations) more detailed input relating to nuclear law and certain environmental questions. A programme of co-operation designed to help FAO in establishing, with INIS standards, a secondary information service for agriculture on a cost-reimbursable basis should enter its operational phase this year.

PLANS FOR 1975-76

L. 18. The number of items processed by INIS is expected to increase by about 10% a year until more or less steady-state operation at a level of some 80 000 items a year is reached; this presupposes that there will be no major changes in subject coverage. It is expected that the Agency will continue to co-operate with OECD(NEA) in covering the field of nuclear law - and perhaps also certain environmental questions - in greater detail. Experiments aimed at improving the system and lowering the input costs of Member States will continue on a modest scale, possibly on the basis of co-operation with certain Member States. It is planned to continue the series of INIS Seminars with one in 1975 and one in 1976, both designed to improve indexing quality and thereby increase retrieval capability. Annual consultative meetings of INIS Liaison Officers and meetings of the Thesaurus Working Group are planned for 1975 and 1976.

PLANS FOR 1977-80

L. 19. INIS will continue to operate with full scope and, if the INIS Advisory Committee so recommends, the handling of abstracts in machine-readable form will be introduced. During the period 1977-80, Member States and the Agency may have to consider the question of improving document delivery systems; announcement systems alone do not

seem to be enough, for the individual scientist or engineer - particularly in developing countries - needs actual documents and data in addition to announcements of their existence. It may also become necessary to consider ways and means of improving the infrastructure for information handling in developing countries so that better use is made of the services of major information systems.

RELATED ACTIVITIES

L.20. The related activities include the training of personnel participating in the system, the provision of advisory services, and the formulation of internationally acceptable information standards.

CO-OPERATION WITH OTHER ORGANIZATIONS

L.21. This sub-programme involves co-operation with UNESCO, FAO, EURATOM and the inputting centres of Member States and of other international organizations.

Library services

OBJECTIVE

L.22. The objective is to provide the Secretariat and Member States with information concerning peaceful uses of atomic energy. For this purpose monographs, journals, reports, films and other material dealing with nuclear energy and related subjects are collected, catalogued and made available. In addition, library training is provided for trainees from libraries specializing in the nuclear field in Member States.

RESULTS TO DATE

L.23. The Library's operations have been mechanized in those areas where mechanization was desirable from the cost/benefit point of view, with the result that the Library is in a position to continue distributing information on its holdings ("IAEA Serial Titles", "New Acquisitions in the IAEA and UNIDO Libraries", "Conference Proceedings in the IAEA Library", the catalogues of the Film Library, etc.) and maintain all other normal library services with a smaller staff. The Film Library, which is a very useful service to Member States, is being expanded through the acquisition of new films and of additional copies of those films which are requested most.

PLANS FOR 1975-76

L.24. Studies will be made of the advisability of introducing tele-processing in the Library at the earliest practical time, the aim being to obviate the preparation of coding sheets for new material, avoid extensive key-punching for the monthly up-dating of the Library files, reduce the need for computer print-outs and accelerate the up-dating of the files.

L.25. The Library will continue working with the UNIDO Library in establishing common procedures in preparation for the merging of the two Libraries when they move to the Donaupark. The Library will also co-operate with UNIDO, IIASA and the Trieste Centre in the production of joint acquisition and serial lists.

L.26. The Library will attempt to increase the utilization of its book collection by making available within the Library and at the Seibersdorf Laboratory, UNIDO, IIASA, the Trieste Centre and the Monaco Laboratory a compact, easy-to-use book catalogue listing all the Library's acquisitions since 1968.

L.27. Special efforts to expand the Film Library and its services to Member States will continue.

PLANS FOR 1977-80

L.28. The Library's staff will be concerned with detailed planning for the move to the Donaupark and for the subsequent merger with the UNIDO Library, and no additional activities are planned to begin until these operations have been completed and normal library services have been resumed.

CO-OPERATION WITH OTHER ORGANIZATIONS

L.29. In addition to the above-mentioned co-operation in the production of joint acquisition and serial lists, the Library will co-operate with the libraries of other organizations in the United Nations family in an improved inter-library loan system.

Computer services

OBJECTIVE

L.30. The objective is to provide electronic data processing services in support of technical information, management and various other activities of the Agency and UNIDO.

RESULTS TO DATE

L.31. The provision of computer services started in 1967. The first computer, an IBM 1401, was replaced by an IBM 360/30 in 1969 and the even larger IBM 370/145 in July 1972. The cost per unit of computational work has decreased since 1969. The availability of a computer has made it possible to do work and plan projects which would not be feasible otherwise. Especially in the processing of information for administrative purposes and of technical information, the Agency's computers have been very valuable.

PLANS FOR 1975-76

L.32. The Computer Section will continue to provide computer services for the Agency and UNIDO. Consideration has been given to the establishment of stations for remote job entry into the computer from both the Agency and UNIDO. Tele-processing systems are planned, the aim being to provide computer users with on-line data processing possibilities when needed. Interactive systems will permit on-line, real-time data inquiry and updating. An expanded core memory of 768K bytes and additional peripheral storage will ensure a better response to the computational needs of users such as the Department of Safeguards and Inspection and to the increased on-line data storage requirements of users such as INIS. It is expected that the Computer Section will continue to work three shifts a day, there being also provision for Saturday and Sunday work when required.

PLANS FOR 1977-80

L.33. It is expected that the computer work load - for both the Agency and UNIDO - will continue to grow and that the computer will ultimately operate three shifts a day for seven days a week. Increased computational capability will be obtained by expansion of the computer memory to its original design limit of 1024K bytes; there is an indication that it could ultimately even be upgraded to 2048K bytes.

CO-OPERATION WITH OTHER ORGANIZATIONS

L.34. At present, computer services are provided for UNIDO. The possibilities of co-operation with other United Nations organizations are being explored. There will be increased contact with computer centres in developing countries.

M. SAFEGUARDS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table M.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	1 370 504	1 886 500	230 500	151 000	381 500	2 268 000	2 820 000
Consultants	8 062	16 000	1 200	-	1 200	17 200	19 200
Overtime	660	500	-	300	300	800	800
Sub-total	1 379 226	1 903 000	231 700	151 300	383 000	2 286 000	2 840 000
Common staff costs	447 656	608 200	77 400	49 000	126 400	734 600	908 000
Travel	241 920	246 000	14 600	56 400	71 000	317 000	370 400
Meetings							
Conferences, symposia, seminars	-	-	-	20 000	20 000	20 000	-
Technical committees, advisory groups	641	48 000	3 000	(2 000)	1 000	49 000	50 000
Representation and hospitality	5 363	6 800	600	-	600	7 400	7 600
Scientific and technical contracts	118 015	120 000	5 000	195 000	200 000	320 000	770 000
Scientific supplies and equipment	308 160	410 000	40 000	30 000	70 000	480 000	500 000
Common services, supplies and equipment	12 646	-	-	-	-	-	-
Other items of expenditure							
Linguistic services	50 552	54 000	7 000	-	7 000	61 000	67 000
Printing and publishing services	-	21 000	1 000	(14 000)	(13 000)	8 000	23 000
Sub-total	2 564 179	3 417 000	380 300 11.1%	485 700 14.2%	866 000 25.3%	4 283 000	5 536 000
Add:							
Transfer from other programmes:							
Laboratory services	361 000	334 000	37 000	15 000	52 000	386 000	438 000
Legal services	82 700	83 000	10 000	-	10 000	93 000	102 000
Computer services	29 151	34 000	2 000	4 000	6 000	40 000	69 000
Sub-total	472 851	451 000	49 000	19 000	68 000	519 000	609 000
TOTAL	3 037 030	3 868 000	429 300 11.1%	504 700 13.0%	934 000 24.1%	4 802 000	6 145 000

SUMMARY OF MANPOWER

Table M. 2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
DDG/IG	1	1	1	-	1	1
D	2	2	2	-	2	2
P-5	18	19	19	-	19	21
P-4	28	31	31	2	33	37
P-3	26	33	33	2	35	39
P-2	12	15	15	(4)	11	7
P-1	-	-	-	-	-	-
Sub-total	87	101	101	-	101	107
GS	33	35	35	-	35	38
M&O	-	-	-	-	-	-
TOTAL	120	136	136	-	136	145

CHANGES IN COSTS AND MANPOWER

Costs

M. 1. It is expected that the cost of the safeguards programme, excluding the amounts transferred from other programmes, will increase in 1975 by $866 000, of which $380 300 is attributable to salary and other price increases and $485 700 is a programme increase.

M. 2. Of the programme increase, an amount of $200 000 represents the additional cost of filling those posts which have been vacant during part or all of the previous year and the additional cost resulting from the proposed upgrading of several posts. The estimates are based on the assumption that in 1975 savings equivalent to eight Professional man/years will be possible. Since the increase in the number of facilities to be covered under safeguards agreements will be gradual, the recruitment of required inspectors will be delayed accordingly. The increase of $56 400 for travel is mainly for inspection travel. There is a net increase of $18 000 in respect of meetings. The increase of $195 000 for Scientific and technical contracts will be needed for the establishment of a network of safeguards analytical laboratories.

M. 3. The total safeguards support costs transferred from other programmes to the safeguards programme are expected to be $519 000 in 1975, which is an increase of $68 000 over the adjusted budget for 1974.

Manpower

M. 4. The inspection work load is expected to increase substantially with the start of the application of safeguards under the agreement with EURATOM and Member States of EURATOM. The manpower needed in 1975 for meeting the larger work load, due also to increased safeguards activities in other States, has been assessed facility by facility and estimated at 64 Professional staff members. It is expected that ten Professionals will be needed in 1975 for the application of safeguards in the United Kingdom and the United States; their training should start late in 1974 or early in 1975. This means a total of 74 Professionals, so that no increase in the manning table from 1974 to 1975 will be necessary.

M. 5. To premit the recruitment of the appropriately qualified personnel necessary for applying safeguards at more complex nuclear facilities, it is proposed to replace in 1975 four P. 2 posts in the manning table by two P-3 and two P-4 posts.

M. 6. In 1976, the normal growth of safeguarded nuclear activities will necessitate six more Professional and three more GS posts in the Division of Operations. It is proposed to replace four P-2 posts by two P-3 and two P-4 posts.

THE PROGRAMME

OBJECTIVE

M. 7. The objective is to apply safeguards under agreements to which the Agency is a party. This involves the establishment of safeguards policies, the implementation of established safeguards procedures and the co-ordination and furtherance of development leading to the maximum effectiveness of safeguards combined with the most efficient use of available resources.

RESULTS TO DATE

M. 8. So far 117 safeguards agreements (22 project agreements, 38 transfer agreements, 8 unilateral submission agreements and 49 agreements in connection with NPT) have been concluded. All of them have been or are being implemented, except for 25 NPT agreements with States which do not have significant peaceful nuclear activities.

PLANS FOR 1975-80

M. 9. The nuclear material subject to safeguards under agreements with the Agency is expected to increase from 17 000 effective kilograms in 1974 to 67 000 effective kilograms in 1975 and 173 000 in 1980 if the Agency applies safeguards to nuclear activities under the United States and the United Kingdom offers.

CO-OPERATION WITH OTHER ORGANIZATIONS

M. 10. The programme involves co-operation with national and regional nuclear energy authorities.

STRUCTURE

M. 11. This programme consists of three sub-programmes, which are dealt with separately below. The Inspector General assures the over-all co-ordination and direction of the Division of Operations, the Division of Development and the Section for Standardization and Administrative Support, each of which is involved in an interconnected manner in all three sub-programmes. It may become necessary to change this structure so as to cope with the growth of the Department of Safeguards and Inspection and with the increase in the scope and complexity of its work.

Summary of manpower and costs

Table M.3

Sub-programme	1975 Costs			1976 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Programme Co-ordination	2.0	2.0	618 500	2.0	2.0	656 600
Safeguards development	22.0	9.0	1 216 900	22.0	9.0	1 731 600
Safeguards operations	74.0	21.0	2 312 400	80.0	24.0	2 999 600
Standardization	3.0	3.0	135 200	3.0	3.0	148 200
TOTAL	101.0	35.0	4 283 000	107.0	38.0	5 536 000

Table M.4

	Man-years P	Man-years GS	1975 Cost estimates Staff	Meetings	Contracts	Other	Total
Programme co-ordination	2.0	2.0	103 500	-	-	515 000	618 500
Safeguards development	22.0	9.0	764 200	69 000	320 000	63 700	1 216 900
Safeguards operations	74.0	21.0	2 017 900	-	-	294 500	2 312 400
Standardization	3.0	3.0	135 000	-	-	200	135 200
TOTAL	101.0	35.0	3 020 600	69 000	320 000	873 400	4 283 000

SUB-PROGRAMMES

Safeguards operations

OBJECTIVE

M.12. The objective is to apply safeguards pursuant both to agreements in connection with NPT and to unilateral submission agreements, safeguards transfer agreements and project agreements concluded under the Agency's Safeguards System (1965, as Provisionally Extended in 1966 and 1968)[M.1]. The main activities involved in fulfilling this objective will be:

(a) Collection, examination and evaluation of design information;

(b) Processing and evaluation of accountancy data on the flow and inventory of nuclear material;

(c) Performance of inspections and the use of surveillance and containment measures to verify the presence of the reported nuclear materials;

(d) Correlation of evaluated accountancy data with inspection results with a view to reaching technical conclusions;

(e) Provision of advice on the preparation of subsidiary arrangements and participation in the negotiation of agreements;

[M.1] Reproduced in document INFCIRC/66/Rev.2.

(f) Arrangements for the collection and re-distribution of samples for chemical analysis; and

(g) Preparation and up-dating of practices for safeguards implementation.

RESULTS TO DATE

M. 13. Safeguards are at present being applied under 9 project agreements, 20 safeguards transfer agreements, 3 unilateral submission agreements and 22 agreements in connection with NPT. They cover nuclear material in 61 power plants, 146 research reactors and 209 other facilities and locations in 36 States.

M. 14. During the past six years over 1400 inspections were carried out, statements on the technical conclusions being presented to the Governments of the States concerned.

M. 15. Several safeguards training courses have been held and over 40 new inspectors have received instruction in the basic principles and practices of Agency safeguards implementation.

PLANS FOR 1975-76

M. 16. It is expected that in 1975 safeguards will be implemented in 30 States having nuclear material subject to agreements in connection with NPT and in 26 States having nuclear material subject to other safeguards agreements (about 35 agreements in connection with NPT are expected to be concluded with States that at present have no significant nuclear activities).

M. 17. It is currently estimated that in 1975 safeguards will extend to nuclear material in 422 facilities, assuming that Agency safeguards will by then be applied in the non-nuclear-weapon Member States of EURATOM. Since the type and number of facilities to be covered by agreements pursuant to the voluntary offers of the United Kingdom and the United States are not yet known, the following table does not include facilities in those countries.

Table M. 5

Facilities subject to safeguards

1973-1975

Type of facility	1973		1974		1975		1975 Total
	Transfer and project agreements	NPT agreements	Transfer and project agreements	NPT agreements	Transfer and project agreements	NPT agreements	
Power plants	21	10	20	40	12	55	67
Conversion plants	1	1	1	2	-	3	3
Fuel fabrication plants	6	3	5	18	1	22	23
Reprocessing plants	-	-	2	3	1	4	5
Pilot fuel fabrication plants	8	3	8	3	3	8	11
Pilot reprocessing plants	4	-	4	-	4	-	4
Research reactors	54	31	47	99	33	113	146
Critical facilities	12	11	12	12	2	22	24
Subcritical facilities	-	6	-	5	-	5	5
Research and development facilities	17	10	13	40	-	53	53
Other locations	71	11	69	12	16	65	81
TOTALS	194	86	181	234	72	350	422

M. 18. Apart from the facilities in the United Kingdom and the United States, the only increase in workload expected in 1976 is that resulting from the normal growth of the nuclear industry. Inspector training courses will continue during 1975 and 1976. A comprehensive training manual will be prepared.

RELATED ACTIVITIES

M. 19. Support for this sub-programme is provided by the Seibersdorf Laboratory through the assembly, servicing and calibrating of surveillance and monitoring equipment used in inspections. Starting in 1975, the Laboratory will participate with laboratories in Member States in an integrated programme for the analysis of samples taken during inspections. The Division of Nuclear Safety and Environmental Protection organizes the requisite monitoring of personnel for radiation doses received on duty in the field. The Legal Division participates in the negotiation of safeguards agreements. The Computer Section provides automatic data processing services. Co-operation is maintained with the Division of Nuclear Power and Reactors, which provides forecasts of trends in the nuclear industry.

PLANS FOR 1977-80

M. 20. Until the close of the present decade, the major growth area in the section of the nuclear industry under safeguards will be power generation. The throughput of the existing bulk fuel fabrication and reprocessing plants will be expanded accordingly and some new facilities will come into operation. The growth of the nuclear industry will tend to be concentrated in certain geographic regions, which will facilitate the economic deployment of inspection effort. In addition, improvements in methods and techniques may lead to a relative reduction in inspection effort.

M. 21. It is expected that regional offices will be established where economically justifiable and where the States concerned concur. The data processing system may have to be adapted to accommodate the functions of these offices.

M. 22. Training courses for new inspectors will continue. Personnel from States' systems of nuclear material accountancy and control will be invited to undergo training together with Agency staff.

CO-OPERATION WITH OTHER ORGANIZATIONS

M. 23. This sub-programme involves continuous and close co-operation with national and regional nuclear energy authorities in maximizing the economies achievable through the appropriate use of States' systems of nuclear material accountancy and control. Governments are continuing to help the Agency train its staff at reactors and at plants where nuclear material is processed in bulk.

Safeguards development

OBJECTIVE

M. 24. The objective is to provide concepts, procedures, techniques and equipment for making safeguards technically and economically effective. The main activities involved in fulfilling this objective will be:

(a) Provision of up-to-date descriptions of existing nuclear material cycles;

(b) Specification of the quantitative results to be achieved in applying safeguards;

(c) Definition of the requirements as regards the information to be provided by States and obtained through inspections and of how such information is to be processed and used;

(d) Study of ways and means of optimizing the safeguards effort;

(e) Support for the operational activities through the evaluation of data, results and conclusions;

(f) Critical review of the adequacy of the safeguards system through the evaluation of results;

(g) Development and optimization of:

(i) Methods, techniques and instrumentation for identifying items and determining quantities of nuclear material;

(iii) Techniques for surveillance of the containment and flow of nuclear material; and

(iv) Automated instruments to provide instantaneous and continuous information relating to nuclear material quantities, nuclear material identification and flow surveillance;

(h) Support for the operational activities through the calibration, installation and maintenance of instruments;

(i) Development, testing, demonstration and review of typical safeguards procedures;

(j) Calculation of inspection effort for typical cases;

(k) Assessment of the effect of the levels of assurance provided by States' systems of nuclear material accountancy and control on the Agency's inspection effort; and

(l) Provision of advice on the application of statistical techniques, including the verification of nuclear material accounting through item identification.

RESULTS TO DATE

M.25. The results of conceptual development work have been incorporated in safeguards agreements and subsidiary arrangements since 1969. Estimates have been made of actual inspection effort, manpower requirements and staff costs. Instruments for field use have been selected and tested.

M.26. A large part of a technical safeguards manual has been prepared, covering:

(a) Procedures for inspections at various types of facility;

(b) Procedures for the evaluation of information provided by States and obtained through inspections;

(c) Procedures for the operation of the quality control programme involving safeguards analytical laboratories;

(d) Techniques for sampling and measurement, containment, surveillance and identification; and

(e) Statistical concepts and techniques.

M.27. A system for the automatic processing and storage of the safeguards data provided by States has been put into operation. Contractual arrangements have been concluded with laboratories which will perform analytical work for safeguards. The specifications for the laboratory facilities that would enable the Agency to do analytical work for safeguards and calibrate inspection instruments have been defined. Progress has been made in the development of non-destructive methods of nuclear material analysis and in containment and surveillance techniques. For feed and product material, non-destructive methods have been further developed and are being put into practice.

PLANS FOR 1975-76

M.28. The quantitative description of the flow of nuclear material throughout the world will be up-dated and the quantitative results of the application of safeguards criteria reviewed. The results and conclusions of the verification procedures will continue to be evaluated for use as input in operations research analysis directed at estimating medium- and long-term manpower and budget requirements based on optimum verification strategies, the techniques used (including item identification and counting as a means of verifying nuclear material accountancy) and the growth of nuclear material cycles. Optimum verification strategies (criteria, inspection planning, procedures, techniques, etc.) will be established for individual facilities or groups of facilities.

M.29. Work will continue on techniques for the automatic and continuous collection of information on the identification, containment and flow of nuclear material and items and on the automatic processing of information obtained through inspections and provided by States. Co-ordination of the systems of nuclear material accountancy and control employed by the Agency and by States will continue.

M.30. An analytical quality control programme with a network of safeguards laboratories will be instituted and techniques for the non-destructive determination of plutonium, uranium and uranium-235 in scrap will be developed. Standard reference materials will be prepared for use in the measurement of each type of nuclear material. Inspection procedures relating to irradiated fuel processing and uranium enrichment facilities will be demonstrated in practice.

M.31. Technical specifications for inspection instruments will be refined and co-ordination of their selection, maintenance and calibration will continue.

M.32. Three or four advisory group or technical committee meetings each year are foreseen. It is proposed to hold in 1975 a symposium on safeguards which would deal with topics related to nuclear material accountancy and control, inspection procedures and the development of techniques and instrumentation.

RELATED ACTIVITIES

M.33. The related activities involve some 20 research and technical service contracts each year. The safeguards analytical laboratory to be established at Seibersdorf will maintain and calibrate equipment and provide analytical services.

PLANS FOR 1977-80

M.34. Most of the activities described, which serve the purpose of optimizing the application of Agency safeguards, will continue with a view to keeping abreast of techno-

logical developments in the fuel cycle and in the area of measurements. Major emphasis will be placed on correlating the data on different nuclear material flows.

CO-OPERATION WITH OTHER ORGANIZATIONS

M. 35. This sub-programme involves co-operation with EURATOM and OECD(NEA) in respect of meetings and research contracts and agreements.

Standardization

OBJECTIVE

M. 36. The objective of this sub-programme is to ensure efficiency and standardization in arrangements with State authorities for the implementation of safeguards agreements, to codify safeguards procedures and to lend logistical support in the application and administration of safeguards.

RESULTS TO DATE

M. 37. Model subsidiary arrangements, including a set of facility attachments for various nuclear installations, have been worked out and are now being reviewed in the light of experience. Up-dating of the internal safeguards manual is continuing.

PLANS FOR 1975-76

M. 38. Subsidiary arrangements are being concluded continuously, while ones already concluded are being reviewed and up-dated. Models are being adapted in the light of experience and new ones elaborated. Administrative arrangements will have to be made for co-ordinating the systems of nuclear material accountancy and control employed by the Agency and by States. Work on internal manuals will receive more emphasis, and in particular procedures for the evaluation of safeguards results will have to be perfected. Preparations will be made for the conference to review the operation of NPT, which is to be held in Geneva in 1975.

PLANS FOR 1977-80

M. 39. Facility attachments to safeguards agreements will have to be prepared for new facilities and old facility attachments revised and up-dated. Existing subsidiary arrangements will have to be adapted to incorporate up-to-date procedures, while standardization will have to continue in respect of all existing subsidiary arrangements. The administrative work involved in applying safeguards will require increased effort and will have to be streamlined and codified so as to make evaluation easier and permit the optimization of results-versus-costs.

N. ADMINISTRATION

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table N.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	1 660 883	1 723 000	196 800	(20 800)	176 000	1 899 000	2 105 000
Consultants	1 274	-	-	600	600	600	800
Overtime	1 929	3 400	400	(300)	100	3 500	3 900
Temporary assistance	9 157	9 800	900	-	900	10 700	11 500
Sub-total	1 673 243	1 736 200	198 100	(20 500)	177 600	1 913 800	2 121 200
Common staff costs	541 276	544 000	77 100	(6 600)	70 500	614 500	678 200
Travel	21 044	27 200	1 600	-	1 600	28 800	30 100
Meetings							
Conferences, symposia, seminars	9 510	14 500	-	(14 500)	(14 500)	-	19 000
Technical committees, advisory groups	-	10 500	1 500	-	1 500	12 000	7 000
Representation and hospitality	7 913	10 600	700	100	800	11 400	12 000
Scientific and technical contracts	20	-	-	-	-	-	-
Common services, supplies and equipment	93 020	93 500	5 500	42 000	47 500	141 000	140 000
Other items of expenditure							
Linguistic services	104 748	112 000	13 000	-	13 000	125 000	138 000
Printing and publishing services	149 724	125 000	32 000	3 000	35 000	160 000	169 000
Other	24 903	49 500	4 000	9 000	13 000	62 500	78 500
Sub-total	2 625 401	2 723 000	333 500 12.2%	12 500 0.5%	346 000 12.7%	3 069 000	3 393 000
Less:							
Amount transferred to Safeguards (Legal services)	82 700	83 000	10 000	-	10 000	93 000	102 000
TOTAL	2 542 701	2 640 000	323 500 12.2%	12 500 0.5%	336 000 12.7%	2 976 000	3 291 000
Data processing services	300 175	315 000	21 000	(36 000)	(15 000)	300 000	320 000

SUMMARY OF MANPOWER

Table N.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
DDG	1	1	1	-	1	1
D	6	6	6	-	6	6
P-5	15	15	14	-	14	14
P-4	14	14	14	-	14	14
P-3	10	10	10	-	10	10
P-2	8	8	8	1	9	9
P-1	7	7	7	(1)	6	6
Sub-total	61	61	60	-	60	60
GS	84	84	84	1	85	85
M&O	-	-	-	-	-	-
TOTAL	145	145	144	1	145	145

CHANGES IN COSTS AND MANPOWER

Costs

N.1. As will be seen from Table N.1 above, the total cost of this programme is expected to increase by $346 000, of which $333 500 is attributable to salary and other price increases and $12 500 is a programme increase.

N.2. The programme increase of $12 500 is the net result of increases and reductions under various items of expenditure. The programme reduction in staff costs is mainly attributable to delays in recruitment, which more than offset the cost of an additional GS post and the upgrading of a Professional post. The programme decrease under meetings reflects a reduction in the number of meetings in the Legal services sub-programme. The programme increase of $42 000 for common services, supplies and equipment is related partly to an increase in the provision for loss on exchange of currencies and partly to the increased requirements for medical services and supplies for the joint IAEA/UNIDO medical services. Under "Other items of expenditure", a programme increase of $9 000 represents increased contributions for inter-agency activities, especially in respect of the International Civil Service Commission.

Manpower

N.3. As will be seen from Table N.2 above, the upgrading of one P-1 post to the P-2 level in the Division of Budget and Finance is foreseen. The Division of Personnel will require one additional GS post. The manning table for 1974 has been adjusted to reflect the transfer of one P-5 post to the "Executive Management and Technical Programme Planning" programme, and the exchange of a Director's post from the Division of External Relations against a P-5 post from the Office of Internal Audit and Management Services.

THE PROGRAMME

OBJECTIVE

N.4. The objective is to ensure the effective functioning of the Agency's administrative activities. The Office of the Deputy Director General for Administration is responsible for

the over-all direction and supervision of the internal audit and management, budget and finance, personnel, legal and external relations services, in addition to the services provided for the policy-making organs (see paragraph A. 5 above), the linguistic services (see paragraphs P. 5 and P. 7 below) and the general services programme (see paragraph O. 4 below).

STRUCTURE

N. 5. This programme consists of five sub-programmes which are dealt with separately below.

Summary of total costs by organization unit

Table N. 3

Organization unit	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Office of the Deputy Director General for Administration	106 587	153 800	15 000	(13 200)	1 800	155 600	181 000
Office of Internal Audit	122 209	155 200	20 700	(11 800)	8 900	164 100	182 000
Division of Budget and Finance	690 314	735 600	81 000	28 400	109 400	845 000	927 000
Division of External Relations	870 219	885 200	111 800	500	112 300	997 500	1 101 000
Legal Division	321 492	325 500	44 300	(14 100)	30 200	355 700	410 000
Division of Personnel	514 580	467 700	60 700	22 700	83 400	551 100	592 000
Sub-total	2 625 401	2 723 000	333 500	12 500	346 000	3 069 000	3 393 000
Less:							
Amount transferred to Safeguards	82 700	83 000	10 000	–	10 000	93 000	102 000
TOTAL	2 542 701	2 640 000	323 500	12 500	336 000	2 976 000	3 291 000

Summary of manpower by organization unit and category

Table N. 4

Organization unit	1973 Adjusted budget				1974 Adjusted budget				1975 Estimate				1976 Preliminary estimates			
	P	GS	M&O	Total	P	GS	M&O	Total	P	GS	M&O	Total	P	GS	M&O	Total
Office of the Deputy Director General for Administration	3	2	-	5	3	2	-	5	3	2	-	5	3	2	-	5
Office of Internal Audit	5	4	-	9	5	4	-	9	5	4	-	9	5	4	-	9
Division of Budget and Finance	16	30	-	46	16	30	-	46	16	30	-	46	16	30	-	46
Division of External Relations	19	21	-	40	19	20	-	39	19	20	-	39	19	20	-	39
Legal Division	8	5	-	13	8	5	-	13	8	5	-	13	8	5	-	13
Division of Personnel	10	22	-	32	9	23	-	32	9	24	-	33	9	24	-	33
TOTAL	61	84	-	145	60	84	-	144	60	85	-	145	60	85	-	145

SUB-PROGRAMMES

Office of internal audit and management services

OBJECTIVE

N.6. The objective is to assist the Director General in achieving the most effective and economic use of the Agency's resources by:

(a) Reviewing the Agency's financial transactions in order to ensure observance of established regulations and procedures,

(b) Providing a management advisory service to all Departments; and

(c) Compiling and keeping up to date the Agency's Administrative Manual and other administrative instructions.

Budget and finance services

OBJECTIVE

N.7. The objective is to develop and implement programme, budgetary and financial procedures to ensure effective financial control and the attainment of programme objectives with the most economic use of available financial resources.

PLANS FOR 1975-80

N.8. The Division of Budget and Finance will continue to:

(a) Provide cost accounting and other services to the Secretariat and for the IAEA/UNIDO common service activities;

(b) Carry out the necessary work relating to Member States' contributions to the Regular and Operational Budgets;

(c) Be responsible for programme budgeting, to ensure the most effective use of resources and to facilitate planning and control of activities;

(d) Keep financial records and provide the data required for effective financial management of the Agency; and

(e) Be responsible for research contract administration and for maintenance of centralized records of all Agency contracts and agreements so that payments by or to the Agency will be made on a timely basis.

CO-OPERATION WITH OTHER ORGANIZATIONS

N.9. The Division of Budget and Finance is responsible for financial execution of UNDP projects and reporting thereon as required, co-operation with CCAQ by participating in inter-agency meetings on financial and budgetary matters, particularly with a view to the improvement of common practices, representation of the Agency in the annual review of the programme and budget by ACABQ, co-ordination with UNESCO with respect to the joint operation of the Trieste Centre, with FAO with respect to the financial operations of the Joint FAO/IAEA Division, with UNIDO with respect to joint services, with particular emphasis on financial and management aspects, and with the Joint Inspection Unit as required.

Personnel services

OBJECTIVE

N.10. The objective is to:

(a) Advise the Director General on all personnel matters and administer the personnel programme throughout the Secretariat;

(b) Recruit the staff of the Secretariat in a manner that will ensure the optimum use of available manpower resources; and

(c) Provide staff welfare services.

PLANS FOR 1975-80

N.11. The Division of Personnel will perform the following functions:

(a) Recruit the international and local staff of the Secretariat. In order to improve the selection of candidates to fill Professional posts wider circulation will be given to vacancy notices and special emphasis will be placed on gathering information on available resources of manpower;

(b) Develop and review personnel policies and procedures, particularly in the light of the recommendations forthcoming from the newly created International Civil Service Commission and other bodies in the United Nations common system;

(c) Implement the Agency's Provisional Staff Regulations and Rules;

(d) Provide welfare services including the administration of medical and life insurance schemes. Emphasis will be placed on facilitating a smooth adjustment of staff to conditions in the host country and in the Secretariat itself. In this context the Division also will participate in the planning of the facilities foreseen for the permanent headquarters at present under construction;

(e) Administer the Agency/UNIDO Joint Medical Service,

(f) Administer and co-ordinate training programmes of a general as well as specialized nature, with the exception of that connected with safeguards and inspection. It is hoped to expand this activity and provide a wider range of training opportunities for the staff;

(g) Organize utilization and deployment studies with a view of using available manpower to the best advantage and determining requirements for additional posts or regrading of posts in any specific area of the programme;

(h) Perform surveys of local salaries and employment conditions to determine proper grading and salaries of locally recruited staff; and

(i) Advise the Director General on all personnel matters, including any actions or changes arising from recommendations made within the United Nations common system.

CO-OPERATION WITH OTHER ORGANIZATIONS

N.12. Co-operation with other organizations will be primarily with UNIDO, particularly in the setting up of common services. This will be of special importance when the two organizations are housed in the same building complex.

N.13. Close co-operation will also continue between the Division and UNIDO in determining conditions of service and the establishment of common grading standards and common policies for appointment and promotion.

N.14. Contact with other international organizations will also be maintained as a basis for formulating advice to the Director General on personnel matters.

Legal services

OBJECTIVE

N.15. The objective is:

(a) To give the Director General legal advice and to provide legal services to the Secretariat relating to all matters concerning the operations of the Agency;

(b) To collect, study and computerize information on nuclear law with a view to assisting Member States;

(c) To carry out training of officials of Member States in the field of nuclear law;

(d) To draft, negotiate and conclude agreements with States and other international organizations, and to advise on the interpretation and application thereof, in particular with regard to safeguards agreement and the Headquarters Agreement [N.1];

(e) To defend the Agency's interests in contentious cases; and

(f) To promote developments in international law which are of interest to the Agency, in particular in the field of nuclear law.

STRUCTURE

N.16. This sub-programme consists of two components which are described in the following paragraphs.

Safeguards agreements

Plans for 1975-80

N.17. The negotiation of agreements based on "The Structure and Content of Agreements between the Agency and States required in connection with the Treaty on the Non-Proliferation of Nuclear Weapons" [N.2] as well as experience gained in the application of the first such agreements constitute extensive material for their interpretation. A preliminary legal analysis of this material as it relates to State systems of accounting for and control of nuclear material was considered during a meeting of a panel of technical experts in 1973. A detailed study by an advisory group of legal experts may prove to be desirable in the course of the period under consideration. Further, it may be necessary to convene an advisory group to study the question of readily available machinery for the settlement of disputes arising out of agreements in connection with NPT. Other meetings may be required with a view to achieving a general, objective and uniform understanding of such agreements.

[N.1] INFCIRC/15.

[N.2] INFCIRC/153.

Development of nuclear law

Plans for 1975-80

N.18. In conjuction with the increase in the planning and commissioning of nuclear power plants in developing countries, and following the recommendations of an expert group regarding the guidelines for adequate and harmonized legislation, the provision of advisory services to developing countries in the field of licensing regulations is expected to be the main feature of this component. Moreover, it is expected that the regulatory requirements for the clearance of food irradiation as a processing technique, which were outlined in general terms by an expert group in 1972, will have to be reconsidered in 1975 or 1976, since the first results of wholesomeness studies being carried out in the International Food Irradiation Project at Karlsruhe will have been obtained and the project will enter a new phase.

N.19. In view of the impact of training courses and regional seminars in nuclear law held during the period 1968-73, on the elaboration and development of legislation for nuclear activities in the developing Member States, further seminars will be organized as appropriate.

N.20. Efforts to computerize information on nuclear law literature and nuclear legislation will be expanded from 1975 onwards.

N.21. Concurrently with the extension of activities relating to the environment and with the development of procedures by IMCO to minimize pollution damage to the marine environment by accidental spillage of noxious substances, the Agency will study the possibility of contributing to the development of such procedures to be applied in cases of accidental release of radioactivity at sea and release arising from inland operations and transport. Such a study may be considered by an advisory group to be convened jointly with the Division of Nuclear Safety and Environmental Protection in 1975 or 1976 with a view to recommending procedures to Member States as internationally acceptable principles.

N.22. There are three international conventions relating to civil liability for nuclear damage, namely: The Vienna Convention on Civil Liability for Nuclear Damage [N.3], the Brussels Convention on the Liability of Operators of Nuclear Ships [N.3] and the Brussels Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material. Work has been undertaken, in co-operation with OECD(NEA), with a view to solving the problems which arise from the existence of two almost identical conventions in the same field, namely, the Vienna Convention and the Paris Convention on Third Party Liability in the Field of Nuclear Energy. Depending on the results obtained, the Agency may be required to co-sponsor an international conference.

External relations

OBJECTIVE

N.23. The Division's main tasks are:

(a) To maintain effective relations and promote efficient co-operation with the Governments of Member States, with the United Nations and its specialized agencies, and with other intergovernmental and non-governmental organizations whose work is related to that of the Agency,

(b) To keep the public informed of the Agency's activities through the media of newspapers, periodicals, radio, television and exhibitions. Efforts will be

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[N.3] Legal Series No.4.

made to facilitate public understanding of the safety and environmental aspects of nuclear reactors and radiation sources, and of applications of nuclear power in view of the energy crisis; and

(c) To provide administrative services for scientific meetings as well as for meetings of the Agency's policy-making organs.

PLANS FOR 1975-80

N.24. Advice will be given to the Director General and the Departments in the Secretariat on relations with Governments and with other organizations.

N.25. The Division will negotiate or assist in the negotiation of agreements, especially in connection with NPT. It will compile reports for the General Conference and prepare documents for the General Conference and the Board on matters affecting the external relations of the Agency. It will also provide for or co-ordinate the Agency's representation at meetings of the United Nations and other international bodies. It will provide visa services to the Secretariat, and protocol services to the Secretariat and to Missions and Delegations.

N.26. Through its offices at United Nations Headquarters in New York and in Geneva, permanent liaison will be maintained with the United Nations and with the Geneva-based organizations of the United Nations and with UNEP.

N.27. Information for the general public will continue to be provided through all media. Short television films will be produced in collaboration with UNIDO.

N.28. A special effort will be made to provide information on the Agency's work to selected institutions and groups, such as universities, public utilities, national federations of industry, trade unions, managers, government officials and economists. While maintaining an impartial attitude towards any controversial subjects concerning nuclear energy, the Division will publish special booklets giving factual information concerning topical problems, their solutions, past experience, and promising fields of research. In particular, Member States in which nuclear power has just been introduced or is about to be introduced will be apprised of the various problems and public reactions in industrialized countries having nuclear power programmes, and the Agency's role in environmental protection will be stressed. The Agency will continue to publish the Bulletin at intervals of two months and the pamphlet, Science Features, the latter on a somewhat reduced scale.

N.29. The main topics in regard to which the Agency's role should continue to be publicized are the energy crisis, the impact of nuclear energy on the environment, the role of nuclear techniques in meeting the need for more food, and nuclear arms control and disarmament. Information will be provided on the conference in 1975 to review the operation of NPT. A special effort will be made to publicize the twentieth anniversary of the establishment of the Agency in 1977.

N.30. The servicing of Agency meetings both in Vienna and at locations in Member States will continue. The total number of meetings now being serviced exceeds 70 per year (23 scientific conferences, symposia and seminars and 52 technical committees and advisory groups).

N.31. Studies are being made with a view to:

(a) Adopting a more rational approach to the organization and classification of, and terminology used in, meetings held by the Agency. This study includes consideration of the possibility of introducing a greater degree of uniformity in the division of responsibilities between scientific and administrative staff servicing meetings;

(b) Establishing, wherever desirable, standing technical committes instead of the recurrent convening of panels or other groups on the same subject;

(c) Introducing a greater degree of standardization in arrangements relating to the costs of participation of experts from Member States in Agency meetings; and

(d) Increasing the number of grants to scientists from developing countries and to discussion leaders eminent in the disciplines being dealt with at meetings.

O. GENERAL SERVICES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table O.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	968 857	1 122 000	126 500	40 000	166 500	1 288 500	1 450 000
Overtime	19 085	13 200	1 800	2 000	3 800	17 000	18 500
Temporary assistance	15 377	5 500	500	(2 500)	(2 000)	3 500	4 500
Sub-total	1 003 319	1 140 700	128 800	39 500	168 300	1 309 000	1 473 000
Common staff costs	316 464	361 200	43 200	13 000	56 200	417 400	467 400
Travel	556	-	-	500	500	500	500
Representation and hospitality	7	100	-	-	-	100	100
Scientific and technical contracts	24 809	35 000	-	-	-	35 000	40 000
Common services, supplies and equipment	812 998	775 000	35 000	-	35 000	810 000	860 000
Other items of expenditure							
Linguistic services	32 402	34 000	5 000	-	5 000	39 000	43 000
Printing and publishing services	265 834	286 000	21 000	-	21 000	307 000	325 000
TOTAL	2 456 389	2 632 000	233 000	53 000	286 000	2 918 000	3 209 000
			8.9%	2.0%	10.9%		
Data processing services	27 921	31 700	2 000	1 300	3 300	35 000	40 000

SUMMARY OF MANPOWER

Table O.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	1	1	1	-	1	1
P-4	2	2	2	-	2	2
P-3	4	4	4	-	4	4
P-2	1	1	1	-	1	1
P-1	-	-	-	-	-	-
Sub-total	9	9	9	-	9	9
GS	55	58	58	10	68	70
M&O	108	117	118	2	120	121
TOTAL	172	184	185	12	197	200

CHANGES IN COSTS AND MANPOWER

Costs

O.1. As will be seen from Table O.1 above, the total cost of this programme is expected to increase by $286 000, of which $233 000 is attributable to salary and other price increases and $53 000 is a programme increase. The programme increase is exclusively attributable to the addition of new posts in the GS and M&O categories. Small increases for overtime and travel are offset by a reduction for temporary assistance.

Manpower

O.2. The manning table for 1974 has been adjusted to reflect the transfer of one M&O post for a cleaner from the Laboratory. For 1975 ten additional GS posts are required. Eight of those posts will be required as a result of the upgrading of six switchboard operators and two clerks from the M&O category to the GS category. The remaining two posts will be used for an electrical engineer and a registry clerk. It is planned to use the eight M&O posts that will thus become vacant for five cleaners, two unskilled workers and one electrician for the maintenance of the additional premises which the Agency will require from 1975 until the move to the permanent headquarters. Two additional M&O posts will be required for unskilled workers, one for building maintenance and one for the archives.

O.3. It is foreseen that two additional GS posts and one additional M&O post will be required in 1976.

Costs of common services, supplies and equipment

Table O.3

Item of Expenditure	1973 Actual obligations	1974 Adjusted budget	1975 Estimate
Division of General Services			
Services			
Communications	191 370	214 000	219 000
Freight and transportation	23 016	24 000	28 000
Rental and maintenance of premises			
Utilities	219 369	232 000	248 000
Rental of premises	7 250	8 000	8 000
Alteration and maintenance of premises	112 664	43 000	47 000
Planning of permanent headquarters	-	-	-
Rental and maintenance of furniture and equipment	95 506	99 000	95 000
Sub-total	649 175 a/	620 000 a/	645 000 a/
Supplies			
Office supplies	38 882	44 000	45 000
Workshop supplies	59 322	48 000	46 000
Petty cash	3 800	3 000	3 000
Building supplies	24 552	22 000	30 000
Sub-total	126 556	117 000	124 000
Equipment			
Office furniture and equipment	31 428	26 000	27 000
Building equipment	5 839	6 500	8 000
Transport equipment	-	5 500	6 000
Sub-total	37 267	38 000	41 000
TOTAL	812 998	775 000	810 000

a/ In addition, contractual services for the planning of new Headquarters are shown under the item Scientific and technical contracts.

OBJECTIVE

O. 4. The objective is to provide engineering, architectural and maintenance services for the Headquarters building, the Seibersdorf Laboratory, the Monaco Laboratory and the Trieste Centre, registry and messenger services (including operation of the archives), purchasing and supply services, transportation services, security services, and housing and other staff services, to operate the Agency's commissary and restaurant, and to participate in the planning of the Agency's permanent headquarters.

PLANS FOR 1975-80

O. 5. The Division of General Services will continue to provide the services and perform the functions set forth in the previous paragraph. In connection with the planning of the Agency's permanent headquarters, it will establish equipment requirements and prepare cost estimates. It is expected that additional temporary premises for about 200 staff members will be made available in 1975, pending the move to the Agency's permanent headquarters, which is scheduled to take place during 1978.

P. SERVICE ACTIVITIES

THE PROGRAMME

P.1. This programme consists of the two sub-programmes which are dealt with separately below. Since each sub-programme is solely concerned with the provision of services in support of the Agency's functional programmes, the total cost in each case is entirely apportioned between those programmes which require the services.

SUB-PROGRAMMES

Linguistic services

Costs of the sub-programme

Summary by items of expenditure: Table P.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	1 101 116	1 215 000	132 000	-	132 000	1 347 000	1 482 000
Overtime	3 174	4 000	500	-	500	4 500	5 000
Temporary assistance	110 734	166 000	20 700	-	20 700	186 700	198 000
Sub-total	1 215 024	1 385 000	153 200	-	153 200	1 538 200	1 685 000
Common staff costs	357 463	388 700	47 800	-	47 800	436 500	476 600
Travel	175	300	-	-	-	300	400
Other items of expenditure							
Linguistic services	(1 572 662)	(1 774 000)	(201 000)	-	(201 000)	(1 975 000)	(2 162 000)
TOTAL	-	-	-	-	-	-	-

Summary of manpower

Table P.2

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	2	2	1	-	1	1
P-5	6	6	7	-	7	7
P-4	15	15	15	-	15	15
P-3	24	24	24	-	24	24
P-2	1	1	1	-	1	1
P-1	-	-	-	-	-	-
Sub-total	48	48	48	-	48	48
GS	38	38	38	-	38	38
M&O	1	1	1	-	1	1
TOTAL	87	87	87	-	87	87

CHANGES IN COSTS AND MANPOWER

Costs

P. 2. As will be seen from Table P. 1, the total cost of linguistic services is charged to the programme for which those services are provided. No programme increase is foreseen for 1975.

Manpower

P. 3. The manning table for 1974 has been adjusted to reflect the exchange of a Director's post against a P-5 post from Executive management and technical programme planning.

STRUCTURE

P. 4. This sub-programme consists of two components, which are dealt with below.

Table P. 3

Programme component	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Interpretation services	273 962	394 000	43 000	-	43 000	437 000	473 000
Translation and records services	1 298 700	1 380 000	158 000	-	158 000	1 538 000	1 689 000
Sub-total	1 572 662	1 774 000	201 000	-	201 000	1 975 000	2 162 000
Less:							
Transfers to other programmes	1 572 662	1 774 000	201 000	-	201 000	1 975 000	2 162 000
TOTAL	-	-	-	-	-	-	-

Interpretation

P. 5. Depending on the character and scope of any meeting held or sponsored by the Agency, simultaneous interpretation from and into four languages may have to be provided for it. The order English, French, Russian, Spanish reflects the frequency of use of these four languages; in addition, German is occasionally required. The interpretation services are also called upon from time to time to assist members of the staff in their day-to-day work by providing consecutive interpretation for meetings of small groups, informal conversations and the like.

P. 6. The work of the interpretation services is expected to remain at about its current level in the years immediately ahead. The total cost of these services in 1975 is estimated at $ 437 000, the expected staff requirements being nine Professional posts and one other post.

Translation and records

P. 7. By far the greatest part of the written translation work in the Secretariat is from and into English, French, Russian and Spanish (the four working languages), with some translation from and into German and rather less from other languages. The material translated consists of the many different types of document prepared throughout the Secretariat or received from outside for meetings held or sponsored by the Agency, the records and reports of those meetings, proceedings and other documents for publication, correspondence, and working papers of all kinds required by the staff for their day-to-day work.

P. 8. In so far as records are concerned, both their provisional and final versions are drafted and edited by the linguistic staff. This staff also provides advice on linguistic matters to the Secretariat as a whole, and types a considerable proportion of the material to be printed by the Agency, the remainder being handled by the publishing services.

P. 9. These activities are expected to remain at about their current level in the years immediately ahead. Their total cost in 1975 is estimated at $ 1 538 000 the expected manpower requirements being 37 Professional posts and 35 other posts.

Printing and publishing services

Costs of the sub-programme
Summary by items of expenditure: Table P. 4

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Salaries and wages							
Established posts	915 647	982 000	148 000	10 000	158 000	1 140 000	1 265 000
Overtime	22 474	26 000	3 000	1 000	4 000	30 000	33 000
Temporary assistance	21 381	21 000	2 000	44 700	46 700	67 700	99 000
Sub-total	959 502	1 029 000	153 000	55 700	208 700	1 237 700	1 397 000
Common staff costs	299 104	315 000	50 800	3 300	54 100	369 100	407 700
Travel	446	800	200	-	200	1 000	1 100
Representation and hospitality	-	200	-	-	-	200	200
Scientific and technical contracts	-	10 000	1 000	-	1 000	11 000	12 000
Common services, supplies and equipment	306 904	328 000	43 000	24 000	67 000	395 000	449 800
Other items of expenditure							
Linguistic services	119 805	130 000	10 000	-	10 000	140 000	150 000
Printing and publishing services	(1 595 595)	(1 748 000)	(208 000)	(83 000)	(291 000)	(2 039 000)	(2 287 800)
TOTAL	90 166	65 000	50 000	-	50 000	115 000	130 000
			76.9%	-	76.9%		

Summary of manpower
Table P. 5

Grade of post	Number of established posts					
	1973 Adjusted	1974	1974 Adjusted	Change	1975	1976 Preliminary estimate
D	1	1	1	-	1	1
P-5	1	1	1	-	1	1
P-4	1	1	1	-	1	1
P-3	5	5	5	-	5	5
P-2	4	4	4	-	4	4
P-1	4	4	4	-	4	4
Sub-total	16	16	16	-	16	16
GS	83	87	87	2	89	89
M&O	25	26	26	-	26	26
TOTAL	124	129	129	2	131	131

CHANGES IN COSTS AND MANPOWER

Costs

P.10. As will be seen from Table 4, the cost of printing and publishing will increase by $341 000, of which $258 000 is attributable to price increases and $83 000 represents a programme increase to meet the cost of additional staff, including temporary assistance, and for the purchase of printing paper to meet the requirements of other programmes, especially for the expanded environmental programme.

P.11. The cost of printing and publishing is charged to the programmes for which services are provided, except the reimbursable cost of services provided for UNIDO under the IAEA/UNIDO services agreement, which is charged to this programme.

Manpower

P.12. Two additional GS posts will be required in 1975, one for proof-reading in French and one for composition typing.

STRUCTURE

P.13. This sub-programme consists of two components, which are dealt with below.

Table P.6

Programme component	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Printing services	912 681	971 000	160 600	40 400	201 000	1 172 000	1 323 000
Publishing services	773 080	842 000	97 400	42 600	140 000	982 000	1 094 800
Sub-total	1 685 761	1 813 000	258 000	83 000	341 000	2 154 000	2 417 800
Less:							
Transfers to other programmes	1 595 595	1 748 000	208 000	83 000	291 000	2 039 000	2 287 800
Reimbursable services rendered to UNIDO	90 166	65 000	50 000	-	50 000	115 000	130 000

Printing services

Objective

P.14. The objective is to provide reproduction and distribution facilities to meet the requirements of the General Conference, the Board, the Secretariat (including the publications programme) and, to the extent possible, UNIDO and other international organizations on a reimbursable basis.

Plans for 1975-80

P.15. The volume of printing work will be determined by the activities of the Agency and UNIDO. Although some increase may be expected, the present space limitations will not permit any extensive expansion. Such an expansion and improvement of the printing services will only be feasible at the time of the move to the Agency's permanent headquarters at the new international centre, where provision is being made for the expansion and modernization of the reproduction and printing services.

Publishing services

Objective

P.16. The objective is to prepare, publish and distribute Agency publications and to act as a publisher for other international organizations, for example the United Nations, ILO, FAO, UNESCO and WHO, thus ensuring a wide dissemination of information on the peaceful uses of atomic energy in Member States as rapidly and economically as possible. About 1000 copies of each publication are provided free of charge to Member States per year, representing a sales value of $500 000. Revenues from sales help to cover publication costs.

Plans for 1975-80

P.17. The Division of Publications will publish the proceedings of the scientific meetings listed elsewhere in this document, as well as other books and journals reflecting the work of the Agency. Thus the content of publications will depend on the Agency's scientific programmes. A continuous effort will be made to distribute Agency publications as extensively as possible. A comprehensive publications catalogue, which is issued every second year, will be published in 1976.

Q. ADJUSTMENT OF PROGRAMME COST ESTIMATES

Table Q.1

Item of expenditure	1973 Actual obligations	1974 Adjusted budget	Increase or (decrease) from 1974			1975 Estimate	1976 Preliminary estimate
			Price	Programme	Total		
Adjustment of programme cost estimates	-	1 800 000	1 000 000	-	1 000 000	2 800 000	2 800 000
Balance of contingent financing appropriation for 1974[a/]	-	800 000	(800 000)	-	(800 000)	-	-
TOTAL	-	2 600 000[b/]	200 000	-	200 000	2 800 000	2 800 000

a/ See General Conference Resolution GC(XVII)/RES/304, para. 1, Section 9.

b/ For an explanation of this figure, see para. 22 above.

CHANGES IN COSTS

Q.1. The Board invites the attention of the General Conference to the fact that the budget estimates presented in this document are based on a rate of exchange of 21.00 Austrian schillings to the United States dollar. However when the Board approved the estimates on 12 June 1974 the United Nations rate of exchange stood at 18.25 schillings to the dollar, and the Board consequently looked into the matter of how the Agency's financial situation would be affected if a mean rate of exchange of less than 21.00 schillings to the dollar should prevail throughout 1975.

Q.2. The Board concluded that Member States would wish to take steps to try to avoid the inconvenience that an eventual supplementary budgetary appropriation for next year would cause to them, and accordingly decided to include in these estimates an amount which was likely to provide for sufficient adjustment of the costs set forth in the earlier parts of the programme budget. The estimate for this purpose of $2.8 million made in Table Q.1 above is based on an exchange rate of 18.50 schillings to the dollar. The Board emphasizes that these funds are only to be used, with its prior approval, for the purpose of compensating for changes in currency exchange rates. [Q.1]

[Q.1] See Annex V, draft resolution A, para. 3.

ANNEX I

CONFERENCES, SYMPOSIA AND SEMINARS

Within the limits of the appropriations and subject to the requirements of the individual programmes as outlined for 1975, it is planned to hold the meetings listed below. Those meetings considered of particular importance by the Scientific Advisory Committee are indicated by an asterisk; the reference following each meeting is to the relevant paragraph in the programme.

Food and agriculture

*1.	Symposium on induced mutations for crop improvement	D. 51
2.	Symposium on nuclear techniques in animal production and health (recommended by FAO)	D. 63

Life sciences

*3.	Symposium on advances in biomedical dosimetry	E. 69
*4.	Symposium on biological effects of low-level radiation pertinent to the protection of man and his environment	E.105
5.	Seminar on utilization of ^{252}Cf in university training and biomedical research	E. 69

Physical sciences

6.	Seminar on research reactor utilization (Near/Middle East)	F. 38
7.	Symposium on nuclear techniques in raw materials industries	F. 53
*8.	Seminar on the status of research and development in the use of high-level radiation for treatment of domestic sewage, industrial waste water and water resources (with Life Sciences)	F. 60
9.	Seminar on non-neutron nuclear data compilation	F.107

International Centre for Theoretical Physics

10.	Solid State Workshop	H. 10
11.	Nuclear Physics Winter College	H. 18
12.	Nuclear Physics Workshop	H. 18
13.	Meeting on oceanography	H. 35
14.	Extended course on mathematics	H. 35
15.	Course on science teaching	H. 36
16.	Summer research session on astrophysics and relativity	H. 30
17.	Meeting on biophysics	H. 33

Nuclear power and reactors

*18.	Symposium on design for power reactor reliability	I. 92
*19.	Symposium on technology and safety of advanced and high-temperature gas-cooled reactors (with Nuclear Safety and Environmental Protection)	I. 99
20.	Seminar on accident analysis	I.120
21.	Seminar on fusion reactors	I.112
22.	Seminar on nuclear data requirements for shielding calculations	I.120

Nuclear safety and environmental protection

*23.	Symposium on the combined effects of radioactive, non-radioactive and thermal releases to the environment	J.108
*24.	Symposium on radiological effects of releases from nuclear facilities into aquatic systems	J.108
25.	Seminar on diagnosis and treatment of incorporated radionuclides; or Economics of radiation protection	J. 36
26.	Seminar on radiological and environmental protection	J. 52

Information and technical services

*27.	Seminar on the International Nuclear Information System	L. 18

Safeguards

*28.	Symposium on accounting for, and control of, nuclear materials and experience with and development of inspection procedures, techniques and instrumentation	M. 32

ANNEX II

TECHNICAL COMMITTEES AND ADVISORY GROUPS

Within the limits of the appropriations and subject to the requirements of the individual programmes as outlined for 1975, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

Executive management and technical programme planning

1.	Scientific Advisory Committee	B. 3

Food and agriculture

2.	Advisory group on water use efficiency	D. 32
3.	Advisory group on induction and utilization of mutations in plant breeding	D. 38
4.	Advisory group on the role of the sterile-male technique in pest management	D. 101
5.	Advisory group on technical and economic feasibility of low-dose irradiation of agricultural products	D. 132

Life sciences

6.	Advisory group on the in vitro receptor assay technique	E. 34
7.	Advisory group on new techniques in absolute dose measurement	E. 51
8.	Advisory group on the role of radiation genetics in the development of industrially useful micro-organisms	E. 87
9.	Advisory group on modification of radiosensitivity in biological systems, with emphasis on chemical radiation protection; or Advisory group to elaborate guidelines for clinical trials of radio-sensitizers	E. 99

Physical sciences

10.	Advisory group on experimental aspects of laser-induced fusion	F. 32
11.	Advisory group on programmes for nuclear physics research in developing countries	F. 25
12.	Technical committee: International Fusion Research Council	F. 32
13.	Technical committee: Joint NEA/IAEA Thermionic Liaison Group	F. 33
14.	Advisory group on nuclear instrumentation	F. 53
15.	Advisory group on applications of isotopic tracers in waste treatment technology	F. 60

16.	Advisory group on chemistry and biochemistry of radio-pharmaceuticals	F. 61
17.	Technical committee on International Hydrological Programme	F. 80
18.	Advisory group on application of nuclear techniques in geothermal studies	F. 82
19.	Advisory group on nuclear data for transactinium isotopes	F. 113
20.	Technical committee: International Nuclear Data Committee	F. 92

International Centre for Theoretical Physics

21.	Scientific Council	

Nuclear power and reactors

22.	Technical committee on uranium demand (with OECD(NEA))	I. 30
23.	Technical committee on uranium resources and production (with OECD(NEA))	I. 30
24.	Technical committee: International Working Group on Fast Reactors	I. 100
25.	Technical committee on MHD electricity generation	I. 116
26.	Advisory group on power economics	I. 20
27.	Advisory group on nuclear power plant reliability specifications	I. 92
28.	Advisory group on nuclear material (ore processing)	I. 42
29.	Advisory group on methods of evaluation of favourable uranium regions	I. 31
30.	Advisory group on methods used for electric load forecasting in nuclear power planning studies	I. 21
31.	Advisory group on fuel fabrication	I. 60
32.	Advisory group on fuel cycle (optimization of fuel cycle processes and services)	I. 61
33.	Advisory group on nuclear power project implementation (Nuclear Power Market Survey)	I. 72
34.	Advisory group on ultrahigh-temperature gas-cooled reactors	I. 112
35.	Advisory group on nuclear power plant quality assurance	I. 93

Nuclear safety and environmental protection

36.	Advisory group on establishment of containment criteria for enclosures in which nuclides of high radiotoxicity are handled	J. 59
37.	Advisory group on compact neutron shielding for sources of small physical size	J. 59

38.	Advisory group on environmental surveillance at national, regional and global levels	J. 47
39.	Advisory group on estimation of population dose	J. 47
40.	Advisory group to study questions of mutual co-operation between countries in the Danube catchment area	J. 48
41.	Advisory group on radiation protection of the public in the event of radiation accidents (with WHO and FAO)	J. 47
42.	Advisory group on disposal of radioactive wastes into the sea	J.112
43.	Technical committee on technologies and practices in managing high-level and alpha-bearing wastes	J. 90
44.	Technical committee on international register of radionuclide releases, storage and disposals	J.113
45.	Advisory group on assessment by systems analysis of the relative significance of exposure of populations to radiation from waste discharges and disposals	J.109
46.	Advisory group on application of cost/risk/benefit analyses of environmental impacts of nuclear programmes and their relation to waste management standards	J.109
47.	Advisory group on the environmental impact of the nuclear power industry	J.109
48.	Technical committee on decommissioning of nuclear facilities	J.123
49.	Advisory group on operational safety problems	J.144
50.	Advisory group on quality assurance requirements for nuclear plants	J.144
51.	Advisory group meeting on radiological safety in fuel fabrication	J. 37
52.	Advisory group meeting on public acceptance of nuclear programmes	J. 50
53.	Advisory group meeting on monitoring of radioactive gaseous and liquid effluents	J. 60
54.	Advisory group on the management of radioactive wastes at nuclear power plants	J. 91
55.	Advisory group on the safe storage, handling and on-site transportation of irradiated fuel and components at reactor plants	J. 91
56.	Advisory group meeting on a code of practice covering waste management in the uranium and thorium mining and milling industry	J. 92
57.	Advisory group on the Agency's responsibilities under the convention on the prevention of marine pollution by dumping of wastes and other matter	J.111

Information and technical services

58.	Technical committee: Annual consultative meeting of INIS liaison officers	L. 18
59.	Technical committee on INIS thesaurus	L. 18

Safeguards

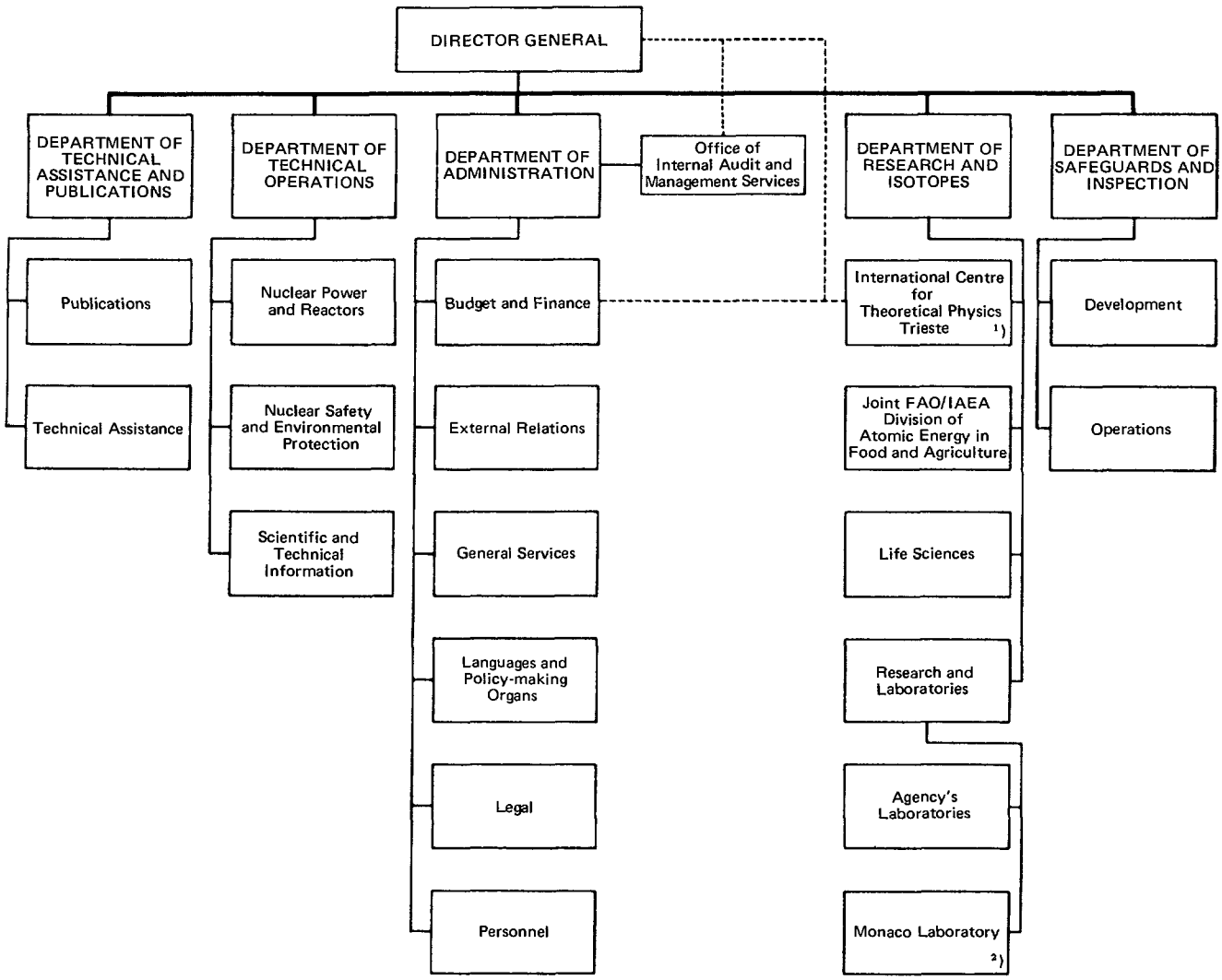
60.	Advisory group on limits of measurement accuracy and standards for quality of safeguards accountancy	M. 32
61.	Advisory group on experience in the implementation of safeguards procedures and on the evaluation of safeguards results	M. 32
62.	Advisory group on experience in the safeguards analytical quality control programme	M. 32
63.	Technical committee on experience in the application of NDA techniques and definition of the targets of the development of safeguards techniques in 1976-1980	M. 32

Administration

64.	Advisory group on regulatory requirements for the clearance of irradiated food for human consumption	N. 18

ANNEX III

ORGANIZATIONAL CHART



1) Jointly operated by the Agency and UNESCO.
2) With the increasing participation of UNESCO and FAO.

ANNEX IV

THE MANNING TABLE

Changes in 1974

Table 1

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	-	-	1	(1)	-	-	-	-	-	-	-	-
Department of Administration												
Office of Internal Audit and Management	-	-	1	(1)	-	-	-	-	-	-	-	-
Division of General Services	-	-	-	-	-	-	-	-	-	-	1	1
Division of External Relations	-	-	(1)	1	-	-	-	-	-	(1)	-	(1)
Division of Languages and Policy-making Organs	-	-	(1)	1	-	-	-	-	-	-	-	-
Division of Personnel	-	-	-	(1)	-	-	-	-	(1)	1	-	-
Department of Research and Isotopes	-	-	-	1	-	-	-	-	1	-	-	1
The Agency's Laboratory	-	-	-	-	-	-	-	-	-	-	(1)	(1)
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-

1974 Adjusted

Table 2

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	2	-	-	-	1	-	4	4	-	8
Department of Administration	-	1	-	1	-	-	-	1	3	2	-	5
Office of Internal Audit and Management	-	-	1	-	1	2	1	-	5	4	-	9
Division of Budget and Finance	-	-	1	3	3	2	2	5	16	30	-	46
Division of General Services	-	-	1	1	2	4	1	-	9	58	118	185
Division of External Relations	-	-	2	6	4	3	3	1	19	20	-	39
Division of Languages and Policy-making Organs	-	-	1	7	17	24	1	-	50	41	1	92
Legal Division	-	-	1	2	3	1	1	-	8	5	-	13
Division of Personnel	-	-	1	2	3	2	1	-	9	23	-	32
Department of Research and Isotopes	-	1	-	1	-	-	1	-	3	2	-	5
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture	-	-	-	5	6	1	-	-	12	8	-	20
Division of Life Sciences	-	-	1	4	6	1	1	1	14	10	-	24
Division of Research and Laboratories	-	-	1	5	6	8	2	1	23	16	-	39
The Agency's Laboratory	-	-	-	5	12	6	5	2	30	52	21	103
The Monaco Laboratory	-	-	-	1	3	1	-	3	8	11	-	19
International Centre for Theoretical Physics	-	-	-	1	1	3	-	-	5	17	-	22
Department of Safeguards and Inspection	-	1	-	1	2	1	-	-	5	5	-	10
Division of Development	-	-	1	7	10	3	1	-	22	9	-	31
Division of Operations	-	-	1	11	19	29	14	-	74	21	-	95
Department of Technical Assistance and Publications	-	1	-	-	-	1	1	-	3	7	-	10
Division of Technical Assistance	-	-	1	7	8	2	1	1	20	30	-	50
Division of Publications	-	-	1	1	1	5	4	4	16	87	26	129
Department of Technical Operations	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Safety and Environmental Protection	-	-	1	9	8	3	-	-	21	13	-	34
Division of Nuclear Power and Reactors	-	-	1	11	6	3	2	-	23	14	-	37
Division of Scientific and Technical Information	-	-	1	3	8	7	7	7	33	62	1	96
TOTAL	1	5	19	94	129	113	50	27	438	553	167	1 158

Changes for 1975

Table 3

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Administration												
Division of Budget and Finance	-	-	-	-	-	-	1	(1)	-	-	-	-
Division of Personnel	-	-	-	-	-	-	-	-	-	1	-	1
Division of General Services	-	-	-	-	-	-	-	-	-	10	2	12
Department of Research and Isotopes												
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture	-	-	-	1	-	-	-	-	1	-	-	1
Division of Research and Laboratories	-	-	-	-	4	(3)	-	-	1	-	-	1
The Agency's Laboratory	-	-	-	-	-	-	-	-	-	3	1	4
The Monaco Laboratory	-	-	-	-	-	-	-	-	-	2	-	2
Department of Safeguards and Inspection	-	-	-	-	2	2	(4)	-	-	-	-	-
Department of Technical Assistance and Publications												
Division of Technical Assistance	-	-	-	-	1	-	-	(1)	-	-	-	-
Division of Publications	-	-	-	-	-	-	-	-	-	2	-	2
Department of Technical Operations												
Division of Nuclear Safety and Environmental Protection	-	-	-	5	3	1	-	-	9	5	-	14
Division of Nuclear Power and Reactors	-	-	-	-	6	-	-	-	6	-	-	6
Division of Scientific and Technical Information	-	-	-	-	1	-	-	(1)	-	4	-	4
TOTAL	-	-	-	6	17	-	(3)	(3)	17	27	3	47

1975

Table 4

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	2	-	-	-	1	-	4	4	-	8
Department of Administration	-	1	-	1	-	-	-	1	3	2	-	5
Office of Internal Audit and Management	-	-	1	-	1	2	1	-	5	4	-	9
Division of Budget and Finance	-	-	1	3	3	2	3	4	16	30	-	46
Division of General Services	-	-	1	1	2	4	1	-	9	68	120	197
Division of External Relations	-	-	2	6	4	3	3	1	19	20	-	39
Division of Languages and Policy-making Organs	-	-	1	7	17	24	1	-	50	41	1	92
Legal Division	-	-	1	2	3	1	1	-	8	5	-	13
Division of Personnel	-	-	1	2	3	2	1	-	9	24	-	33
Department of Research and Isotopes	-	1	-	1	-	-	1	-	3	2	-	5
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture	-	-	-	6	6	1	-	-	13	8	-	21
Division of Life Sciences	-	-	1	4	6	1	1	1	14	10	-	24
Division of Research and Laboratories	-	-	1	5	10	5	2	1	24	16	-	40
The Agency's Laboratory	-	-	-	5	12	6	5	2	30	55	22	107
The Monaco Laboratory	-	-	-	1	3	1	-	3	8	13	-	21
International Centre for Theoretical Physics	-	-	-	1	1	3	-	-	5	17	-	22
Department of Safeguards and Inspection	-	1	-	1	2	1	-	-	5	5	-	10
Division of Development	-	-	1	7	10	3	1	-	22	9	-	31
Division of Operations	-	-	1	11	21	31	10	-	74	21	-	95
Department of Technical Assistance and Publications	-	1	-	-	-	1	1	-	3	7	-	10
Division of Technical Assistance	-	-	1	7	9	2	1	-	20	30	-	50
Division of Publications	-	-	1	1	1	5	4	4	16	89	26	131
Department of Technical Operations	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Safety and Environmental Protection	-	-	1	14	11	4	-	-	30	18	-	48
Division of Nuclear Power and Reactors	-	-	1	11	12	3	2	-	29	14	-	43
Division of Scientific and Technical Information	-	-	1	3	9	7	7	6	33	66	1	100
TOTAL	1	5	19	100	146	113	47	24	455	580	170	1205

1976

Table 5

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	2	-	-	-	1	-	4	4	-	8
Department of Administration	-	1	-	1	-	-	-	1	3	2	-	5
Office of Internal Audit and Management	-	-	1	-	1	2	1	-	5	4	-	9
Division of Budget and Finance	-	-	1	3	3	2	3	4	16	30	-	46
Division of General Services	-	-	1	1	2	4	1	-	9	70	121	200
Division of External Relations	-	-	2	6	4	3	3	1	19	20	-	39
Division of Languages and Policy-making Organs	-	-	1	7	17	24	1	-	50	41	1	92
Legal Division	-	-	1	2	3	1	1	-	8	5	-	13
Division of Personnel	-	-	1	2	3	2	1	-	9	24	-	33
Department of Research and Isotopes	-	1	-	1	-	-	1	-	3	2	-	5
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture	-	-	-	6	6	1	-	-	13	8	-	21
Division of Life Sciences	-	-	1	4	6	1	1	1	14	10	-	24
Division of Research and Laboratories	-	-	1	5	10	5	2	1	24	16	-	40
The Agency's Laboratory	-	-	-	5	12	6	5	2	30	59	24	113
The Monaco Laboratory	-	-	-	1	3	1	-	3	8	13	-	21
International Centre for Theoretical Physics	-	-	-	1	1	3	-	-	5	17	-	22
Department of Safeguards and Inspection	-	1	-	1	2	1	-	-	5	5	-	10
Division of Development	-	-	1	7	10	3	1	-	22	9	-	31
Division of Operations	-	-	1	13	25	35	6	-	80	24	-	104
Department of Technical Assistance and Publications	-	1	-	-	-	1	1	-	3	7	-	10
Division of Technical Assistance	-	-	1	7	9	2	1	-	20	30	-	50
Division of Publications	-	-	1	1	1	5	4	4	16	89	26	131
Department of Technical Operations	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Safety and Environmental Protection	-	-	1	16	12	4	-	-	33	19	-	52
Division of Nuclear Power and Reactors	-	-	1	11	12	3	2	-	29	14	-	43
Division of Scientific and Technical Information	-	-	1	3	9	8	7	4	32	69	1	102
TOTAL	1	5	19	104	151	118	43	22	463	593	173	1229

ANNEX V

Draft resolutions

A. REGULAR BUDGET APPROPRIATIONS FOR 1975

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Regular Budget of the Agency for 1975 [1],

1. Appropriates an amount of $29 675 000 for the Regular Budget expenses of the Agency in 1975, as follows:

Section		United States dollars
1.	Policy-making organs	958 000
2.	Executive management and administration [2]	3 729 000
3.	General services	2 918 000
4.	Technical assistance and training	1 285 000
5.	Research and isotopes [3]	3 839 000
6.	Operational facilities [4]	2 310 000
7.	Technical operations [5]	7 034 000
8.	Safeguards	4 802 000
9.	Adjustment of programme cost estimates	2 800 000
	TOTAL	29 675 000

2. Decides that the foregoing appropriation shall be financed as follows:

(a) $2 215 000 from miscellaneous income, including refunds from the United Nations Joint Staff Pension Fund and from the Special Account of the United Nations, and $800 000 from the unused balance of the contingent financing appropriation for 1974 [6]; and

(b) $26 660 000 from contributions by Member States on the basis of the scale of assessment fixed by the General Conference in Resolution GC(XVIII)/RES/526 ;

3. Decides further that the funds appropriated for Section 9 in paragraph 1 above shall be used only, with the prior approval of the Board of Governors, for the purpose of compensating for changes in currency exchange rates; and

4. Authorizes the Director General:

(a) In respect of the Laboratory, the expanded programme on nuclear safety and environmental protection, publications, research contracts and services provided to Member States or international organizations, to incur expenditures additional to those for which provision is made in the Regular Budget for 1975, provided that the relevant emoluments of any staff involved and all other costs are entirely financed from revenues arising out of sales, work performed for

Member States or international organizations, research grants, special contributions or other sources extraneous to the Regular and Operational Budgets for 1975; and

(b) With the prior approval of the Board of Governors, to make transfers between any of the Sections listed in paragraph 1 above.

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[1] GC(XVIII)/526.

[2] Comprising Executive management and technical programme planning, Administration and Service activities.

[3] Comprising Food and agriculture, Life sciences and Physical sciences.

[4] Comprising the Laboratory, the International Centre for Theoretical Physics and the International Laboratory of Marine Radioactivity.

[5] Comprising Nuclear power and reactors, Nuclear safety and environmental protection and Information and technical services.

[6] See Resolution GC(XVII)/RES/304, para. 1, Section 9.

B. OPERATIONAL BUDGET ALLOCATIONS FOR 1975

The General Conference,

(a) Accepting the recommendations of the Board of Governors relating to the Agency's operational programme for 1975 [1], and

(b) Noting that funds from various sources, estimated at $1 266 000, are expected to be available for that programme,

1. Decides that for 1975 the target for voluntary contributions to the General Fund shall be $4.5 million;

2. Urges all Member States to make voluntary contributions to the General Fund for 1975 in accordance with Article XIV.F of the Statute, with paragraph 2 of its Resolution GC(V)/RES/100 as amended by Resolution GC(XV)/RES/286 and with paragraph 3 of the former Resolution, so that this target may be reached;

3. Allocates the following sums for the Agency's operational programme for 1975:

	United States dollars
Operating Fund I	1 121 000
Operating Fund II	4 680 000
	5 801 000

4. Authorizes the Director General to incur expenditures for the International Laboratory of Marine Radioactivity or for the International Centre for Theoretical Physics in addition to those for which provision is made in the Operational Budget for 1975, provided that the relevant emoluments of any staff involved and all other costs are entirely financed from revenues arising out of work performed for Member States or international organizations, research grants, special contributions or other sources extraneous to the Regular and Operational Budgets for 1975.

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[1] GC(XVIII)/526.

C. THE WORKING CAPITAL FUND IN 1975

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Agency's Working Capital Fund in 1975 [1],

1. Approves a level of $2 million for the Agency's Working Capital Fund in 1975;

2. Decides that the Fund shall be financed, administered and used in 1975 in accordance with the relevant provisions of the Agency's Financial Regulations [2];

3. Authorizes the Director General to make advances from the Fund:

(a) Not exceeding $25 000 at any time, to finance temporarily projects or activities of a strictly self-liquidating character which will not necessitate an increase in the Fund in future years; and

(b) With the prior approval of the Board of Governors, unless in his opinion the situation requires immediate action before such approval can be obtained, to meet the cost incurred by the Agency in organizing and rendering emergency assistance to Member States in connection with radiation accidents, up to $50 000 in each case; and

4. Requests the Director General to submit to the Board statements of advances made from the Fund under the authority given in paragraph 3 above.

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[1] GC(XVIII)/526.

[2] INFCIRC/8/Rev.1 and Mod.1.

ANNEX VI

EXPANSION OF THE AGENCY'S TRAINING ACTIVITIES IN RELATION TO THE INTRODUCTION OF NUCLEAR POWER INTO DEVELOPING MEMBER STATES

Introduction

1. Recent increases in world oil prices are expected to lead to a considerable increase in the number of developing countries that embark on nuclear power programmes in the years immediately ahead. Early in 1973, on the basis of the prices then prevailing, it was expected that about five developing countries would initiate nuclear power projects at an early date, bringing the total number with active nuclear programmes to 15; it is now understood that about the same number again are interested in the possibilities of the introduction of nuclear power somewhat later on.

2. It is evident that many of these countries, now faced with the urgent need to introduce nuclear power at an earlier date than they had anticipated, will require special assistance from the Agency. An important part of this assistance will be the training of the key staff needed to ensure that the nuclear power projects are successfully carried through. It is planned, therefore, to expand the Agency's current training activities with a view to meeting the increased needs for skilled staff. The following paragraphs review the kinds of training required, the scope of the expanded programme and the intended method of carrying it out.

The expanded programme

3. Analysis of the manpower needs of countries that are actively pursuing nuclear power programmes shows that three separate groups of manpower must be trained, namely:

(a) A licensing and regulatory group staffed by government personnel;

(b) A project group consisting of utility personnel to plan, evaluate, select and follow each project up to the date of commissioning the nuclear power plant; and

(c) An operations group staffed by utility personnel to run the plant subsequently.

In a country introducing its first nuclear plant, about eight people will be needed for the first group, 30 for the second and 80-90 [1] for the third. The training of this latter group clearly presents a considerable task, but it can be obtained from the supplier under the terms of his tender for the nuclear equipment and need not therefore be provided through the Agency. The training of the first two groups must precede the selection of that supplier and represents an activity for which the Agency's assistance will be very much needed.

4. The organizational structure of the project group will typically consist of a project manager's office and sections dealing with engineering, siting and safety, quality assurance, construction monitoring, fuel supply and public information. This group will be responsible for laying down specifications and ensuring that the work of the main contractor and outside consultants meet them.

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[1] This figure does not include 30-40 maintenance personnel who can, however, be shared among several other, non-nuclear plants as well.

5. Assuming that the Agency will only be called upon to train the senior project and regulatory staff, about ten people will have to be trained in nuclear power engineering in each country, including one or two from the regulatory group (who will also have to be given training in one of the specialized training courses mentioned in paragraph 7 below). The training of these ten people will have to be given before the power project is initiated and will last from six to eleven months. On this basis, assuming that the total training needs will be spread over five years, the training of about 50 key people each year over the period 1975-1979 should meet the needs of the developing countries now engaged in nuclear power programmes or expected to become so engaged in the reasonably near future.

6. It is planned that the cornerstone of this training programme will be a course in nuclear power engineering to be given annually. It will be different from the usual nuclear engineering courses in that it will be designed to provide qualified technical personnel for the planning and construction phases of nuclear power plants. The trainees will be mainly civil, electrical and mechanical engineers with from five to ten years of experience on heavy construction projects. The courses will be of six to nine months' duration and will be of a practical rather than theoretical nature. The syllabus will include: power system planning; types and characteristics of nuclear reactors; the nuclear steam supply system and the remainder of the generating plant; nuclear fuel cycles; environmental and siting considerations; quality assurance methods; radiation safety and protection; waste disposal; contract preparation and bid evaluation; licensing and regulatory aspects; project planning and execution.

7. As a follow-up to the nuclear power engineering course, three or four comparatively short, highly specialized courses will be held each year according to demand. These courses will cover: licensing and regulatory aspects; planning and scheduling for the first nuclear power plant; quality assurance and non-destructive testing; radiation and health physics; economic planning of power systems; considerations for the selection of reactor types and vendors; safety standards, regulations and procedures. Each course will be for about 20 participants.

8. The primary training mechanism of the Agency has been its fellowship programme, under which a total of 339 awards have so far been made for studies directly related to the development of nuclear power. Most of these fellowships have, however, at the request of Governments, been for academic training with emphasis on research, and not for the practical training along the lines outlined above which is needed when a nuclear power project is to be launched. The expanded programme is intended to restore the balance, and about 50 special fellowships will have to be made available each year for on-the-job training in current construction and safety techniques in nculear power plants.

Organizational arrangements

9. Arrangements are being made for draft curricula for the various training courses to be prepared by consultants, the aim being to complete them by September 1974. It is intended that the draft curricula should be reviewed early in 1975 by representatives of those Member States that offer to co-operate in providing the training. [2] Following final elaboration of the curricula and associated plans, the Director General intends to circularize all developing Member States which are likely to wish in the first instance to take advantage of the expanded training facilities that the Agency will thus be offering. It is envisaged that the first nuclear power engineering course will start in the last quarter of 1975 and that the course will be repeated each year at the same period. This tentative time-table and the planned annual duration of the course (six to nine months) will, however, be subject to change in the light of advice received during the planning process outlined above and the experience gained from the first group of courses.

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[2] See the following paragraph.

Financial arrangements

10. The Director General has brought the foregoing scheme for the training courses to the attention of selected Member States, inquiring whether they would be prepared to make some preliminary commitments to provide cost-free facilities and staff. It is envisaged that the Agency will pay the subsistence costs of participants in the courses, and that their Governments will pay their travel costs to and from the host centre.

11. At this stage it is estimated that the cost of holding the training courses will amount to about $600 000 each year, of which some $500 000 will be needed for the nuclear power engineering course. It seems likely that most of the funds will have to come from Operating Fund II.

12. For 1975 - the initial year of the expanded training programme - it is however expected that some $200 000 will suffice, given the fact that it is planned not to hold the first of the courses until late in the year.

13. It is nonetheless foreseen that in 1975 there may well be a demand for a good proportion of the 50 fellowships mentioned in paragraph 8 above. It is hoped that it will prove possible to meet such requests by using the Type I and Type II fellowships that are expected to be available next year.