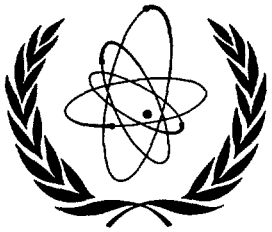

International Atomic Energy Agency

THE AGENCY'S BUDGET FOR 1969 AND PROGRAMME FOR 1969 – 74

GC(XII)/385

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CONTENTS

LIST OF ABBREVIATIONS

ACABQ	Advisory Committee on Administrative and Budgetary Questions (of the General Assembly of the United Nations)
ACC	Administrative Committee on Co-ordination (of the United Nations)
Agency	International Atomic Energy Agency
Board	Board of Governors (of the Agency)
D	Director
DDG	Deputy Director General
DG	Director General
ECA	Economic Commission for Africa (of the United Nations)
ECAFE	Economic Commission for Asia and the Far East (of the United Nations)
ECLA	Economic Commission for Latin America (of the United Nations)
ECOSOC	Economic and Social Council of the United Nations
ENEA	European Nuclear Energy Agency
EUCARPIA	European Association for Research on Plant Breeding
EURATOM	European Atomic Energy Community
FAO	Food and Agriculture Organization of the United Nations
FORTRAN	Formula Translation Computer Programming Language
GS	General Service category (staff)
IBM	International Business Machines
IBRD	International Bank for Reconstruction and Development
ICRP	International Commission on Radiological Protection
ICRU	International Commission on Radiation Units and Measurements
ICSH	International Committee for Standardization in Haematology
IG	Inspector General
IHD	International Hydrological Decade
ILO	International Labour Organisation
INDC	International Nuclear Data Committee
INIS	International Nuclear Information System
IOMP	International Organization for Medical Physics
IPA	Joint training and research project between Inida, Philippines and the Agency, using a neutron crystal spectrometer
IUPAC	International Union of Pure and Applied Chemistry
Joint FAO/IAEA Division	Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture
LWR	Light-water reactor

M&O	Maintenance and Operatives Service (staff)
MHD	Magnetohydrodynamics
The Monaco Laboratory	International Laboratory of Marine Radioactivity at Monaco
MW	Megawatt
MW(e)	Megawatt (electric)
NPY	Co-operative research project in reactor physics between the Agency and the Governments of Norway, Poland and Yugoslavia
P	Professional category (staff)
PL/1	Programming Language No. 1 for computers
SABRAO	Society for the Advancement of Breeding Research in Asia and Oceania
SAC	Scientific Advisory Committee (of the Agency)
TBP	Tributyl phosphate
The Trieste Centre	International Centre for Theoretical Physics at Trieste
UNDP	United Nations Development Programme
UNDP/SF	Special Fund Component of the United Nations Development Programme
UNDP/TA	Technical Assistance Component of the United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USAEC	United States Atomic Energy Commission
WHO	World Health Organization
WMO	World Meteorological Organization

NOTE

All sums of money are expressed in United States dollars.

I. INTRODUCTION

A. GENERAL

1. In the present volume the Board of Governors presents to the General Conference:

(a) The programme of work for the Agency for the six-year period 1969 to 1974;

(b) Cost estimates for the component parts of the programme for the years 1969 and 1970 and, in so far as it is possible to give them at this stage, indications of budgetary trends for the remaining four years. It is emphasized that the estimates for 1970 are at this stage tentative and intended only as an indication of likely financial implications for the second programme year; and

(c) Proposals for budgetary appropriations and allocations for the year 1969 which, upon approval by the General Conference, will provide funds for the first year of the six-year programme.

2. It is the Board's intention in future to bring the Agency's programme up to date every two years and to inform the General Conference, at every alternate session, of the programme planned for the six-year period ahead. Further, the Board plans to request the Conference annually to appropriate funds for the execution of that part of the programme which is planned for the year immediately ahead. It is hoped that the document to be laid before the Conference in 1969 will be less voluminous than the present one, since it will consist only of indications of significant changes in the programme for 1970 and of revised cost estimates for the year, on the basis of which the General Conference will be requested to appropriate the necessary funds.

3. Thus, the programme and budget cycle for the Agency will in future consist of:

(a) Presentation, every two years, of a six-year programme with detailed cost estimates for the first two years and proposals for appropriations for the first year only; and

(b) Presentation, in every alternate year, of only major changes affecting the work during the second year of the programme, and of revised cost estimates and proposals for appropriations for the second year.

4. The Board believes that this system meets in full the recommendations of the Ad Hoc Committee of Experts to Examine the Finances of the United Nations and the Specialized Agencies [1] and in particular the requirement that governing bodies should be informed of programmes and their likely financial implications well in advance of the time when requests for appropriations are laid before them.

5. Further, the Board has made certain important changes in the presentation of the programme and budget, designed both to meet certain recommendations of the Expert Committee referred to in the preceding paragraph and to identify costs more closely with the various important tasks which the Agency has to carry out. The Board has long felt that this latter aspect is important because the Governments responsible for providing the

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[1] See United Nations document A/6343.

necessary finances for the programme will not only be able to see where the money goes but will, through the respective governing bodies, be able to determine more exactly where emphasis, backed by financial support, should be increased or otherwise modified. The details of the changes, their motivation and their hoped-for advantages are dealt with in the introductory sections in the programme and the budget, which follow. It is at this stage only necessary to add that the Board expects that in the course of time it will be possible to refine the presentation still further; with the possibility of enlisting the aid of the Agency's computer, additional statistical and even more detailed financial data will progressively become available for incorporation in future programme and budget documents.

B. PRESENTATION

6. In order to provide as much information as possible on the financial requirements for each separate part of the Agency's programme for 1969-74 the Board has attempted to present a detailed programme-budget. This has inevitably led to a fundamental change in the layout of the present document in comparison with previous programmes and budgets of the Agency. Without discussing at this stage the content of either the programme or the budget, the following notes on the revised presentation may be helpful to the reader.

7. The arrangement of the programme by subject is, in general, the same as in previous years. In order, however, to meet the requirements of ECOSOC for a break-down of expenditure by major programme items, as well as to include all relevant costs, relating them as far as possible to the organizational structure and the functions of the various units and bodies of the Agency, the component parts of the programme are arranged in the following order:

A. Policy-making organs

B. Executive management and technical programme planning

C. Programmes of activity

1. Technical assistance and training
2. Food and agriculture
3. Life sciences
4. Physical sciences
5. The Laboratory
6. The International Centre for Theoretical Physics
7. Nuclear power and reactors
8. Health, safety and waste management
9. The International Laboratory of Marine Radioactivity
10. Information and technical services
11. Safeguards

D. Service and support activities common to a number of programmes

E. Administrative services

1. Administration
2. Common services

F. Other budgetary provisions

8. For each of the foregoing parts and sections of the programme, a summary of programme costs and highlights is given, followed by texts consisting of general references and an enumeration of activities proposed for each of the years 1969 and 1970; in so far as it is possible to do so at this stage, activities now planned for the two-year period 1971-1972 and activities contemplated for 1973-1974 are also enumerated.

9. Each programme part and section is then followed by an explanation of changes in costs between 1968 and 1969, with reference tables or explanatory notes in justification of the changes in staff and expenditure proposed. To the extent possible, organizational units of the Agency have been kept within one programme and entities like the laboratories and the Trieste Centre have been shown separately in order to facilitate presentation and understanding.[2] It will also be noted that programme costs have been listed in accordance with Regular Budget Appropriation Sections and Operational Budget allocations, so that the costs shown represent the best estimate of the total financial effort devoted to each facet of the Agency's work.

10. With regard to the budget itself, appropriations follow the general pattern of previous years, with certain simplifications, namely:

(a) The combination in one Appropriation Section entitled "Policy-making organs" of the previous separate appropriations for the General Conference and the Board of Governors;

(b) The deletion of the previous Section entitled "Special missions" and inclusion of the relevant provision as a separate item in the Section previously entitled "Duty travel of staff", which is now entitled "Duty travel and missions"; and

(c) The introduction of a new Appropriation Section entitled "Operational facilities" to provide for that part of the costs of the Agency's laboratories at Seibersdorf and Monaco and of the International Centre for Theoretical Physics at Trieste which is borne by the Regular Budget; further explanatory notes on this subject are provided in paragraph 17 below.

C. THE PROGRAMME

11. In the preparation of the Agency's programme for the six-year period 1969 to 1974, account has been taken of the experience gained in past years and of the review of the Agency's activities which was carried out during 1967.[3] To the extent possible, consultations have taken place with other international organizations; the part of the

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[2] In this connection, it is to be noted that some changes were made in the structure of the Secretariat during the period in which this long document was being completed. The Department of Safeguards and Inspection has been divided into two Divisions, the Division of Development and the Division of Operations. In the former Department of Technical Assistance, which is now called the Department of Technical Assistance and Publications, a single Division of Technical Assistance has been formed from the Programme and Implementation Divisions, and a new Division of Publications has been set up, composed of the Editing and Publications Section from the Division of Scientific and Technical Information (Department of Technical Operations) and the Documents Services from the Division of Conference and General Services (Department of Administration). An Office of Internal Audit and Management Services has been formed from the former Office of Internal Audit (Office of the Director General) and former Management Unit (Division of Budget and Finance, Department of Administration); this new Office is attached to the Office of the Deputy Director General for Administration. None of these changes are reflected in this document.

[3] See document GC(XI)/362 and Add.1 and 2.

programme related to food and agriculture has been prepared by the Joint FAO/IAEA Division, and work related to the uses of nuclear energy in medicine is being planned in increasingly close collaboration with WHO.

12. The following activities have now been completed:

(a) Enrichment of tritium in natural water by means of gas chromatography; and

(b) Establishment of analytical standards for low-grade uranium ores.

13. The co-ordinated research programme on the use of radioisotope techniques in the study of malnutrition in tropical and sub-tropical regions, initiated in 1965, will be terminated in 1969, and the co-ordinated programme on maize and rice will gradually taper off. Other programmes not likely to continue in their present form are some of the joint projects (for example, the Joint Norway/Agency Research Programme in reactor physics with the zero power reactor "NORA" and the Regional Joint Training and Research Programme using a Neutron Crystal Spectrometer between the Agency, India and the Philippines) which will probably have fulfilled their original objectives by 1969-70 so that further work can be left to the Member States directly involved. The drafting of basic safety standards should be completed by 1969-70 so that from that time the Agency could shift its main effort to assisting Member States in their application. Further, with the availability of computer files of bibliographical data in the Agency and elsewhere, some staff now engaged in the manual preparation of bibliographies may be released for other duties. It is not possible to state in terms of dollars just what savings may result from this scaling down, but it is clear that both in terms of released funds and manpower they will be absorbed by the increased emphasis being placed on the activities referred to in paragraph 14 below.

14. Major developments on the international scene are likely to influence the Agency's programme structure from the outside and require both additional personnel within the Secretariat and additional financing. The conclusion of a treaty on the non-proliferation of nuclear weapons will mean a considerable growth of the Agency's safeguards responsibilities within the next few years. As no task has yet been formally given to the Agency, such responsibilities have not been taken into account in this document. The great increase in the use of nuclear power for electricity production is likely to continue, with a resulting normalization and commercialization of the provision of nuclear power plants. In the related field of nuclear desalting the first prototype stations are being built and the Agency's programme will likely be affected when empirical data from plant construction and operations become available. The increased large-scale use of nuclear power is also likely to mean that the Agency's regulatory and standardization work in, for instance, waste management, will become of increasing importance. Further, the increasing use of nuclear techniques in agriculture, medicine and hydrology, as well as in industry, will stress the Agency's responsibility for developing the techniques to the stage of routine application, which will to a great extent be taken over by other organizations. The Agency's activities to promote the exchange and dissemination of information will constitute a continuing responsibility and it is likely that INIS will become a central function for the Agency, as it will be both in a unique position and well qualified to undertake this work.

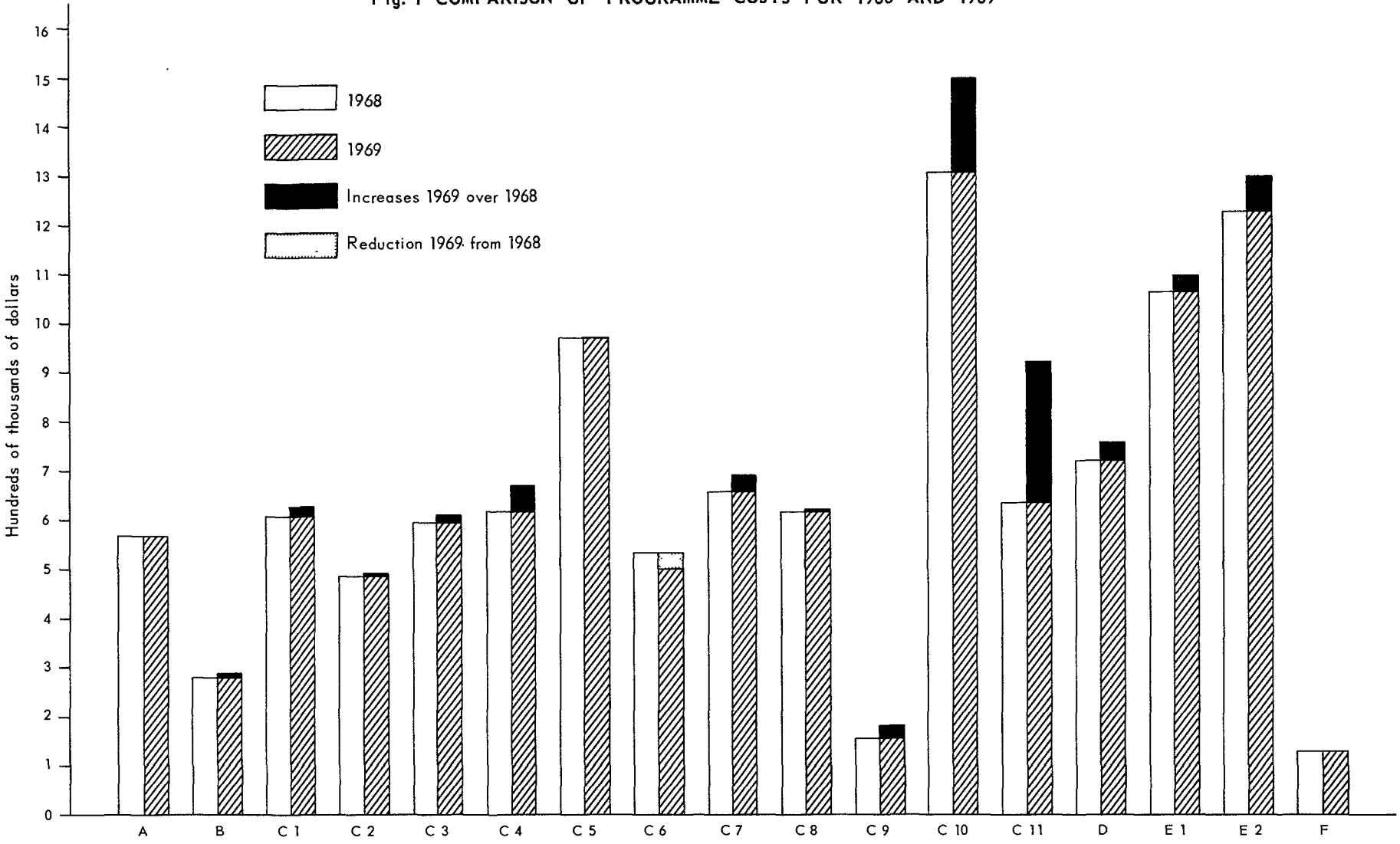
15. In Table 1 below appears a comparison of present cost levels of major programme items with those proposed for 1969 and a tentative forecast of likely costs in 1970. A graphic presentation of increases in the various programme items in 1969 as compared with the budget for 1968 is shown in Fig. 1.

Table 1

Summary of programme costs

	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
A. Policy-making organs	568 500	-	568 500	21 500	590 000
B. Executive management and technical programme planning	280 000	10 500	290 500	500	291 000
C. Programmes of activity					
1. Technical assistance assistance and training	2 452 700	14 000	2 466 700	30 500	2 497 200
2. Food and agriculture	487 000	7 500	494 500	35 000	529 500
3. Life sciences	597 500	16 200	613 700	49 000	662 700
4. Physical sciences	616 000	52 200	668 200	51 000	719 200
5. The Laboratory	969 500	1 500	971 000	62 000	1 033 000
6. The Trieste Centre	532 500	(32 500)	500 000	60 000	560 000
7. Nuclear power and reactors	657 000	31 500	688 500	53 300	741 800
8. Health, safety and waste management	616 000	7 700	623 700	46 500	670 200
9. The Monaco Laboratory	153 000	23 000	176 000	14 000	190 000
10. Information and technical services	1 308 900	192 300	1 501 200	128 000	1 629 200
11. Safeguards	634 300	287 600	921 900	310 400	1 232 300
Sub-total	9 024 400	601 000	9 625 400	839 700	10 465 100
D. Service and support activities common to a number of programmes	720 800	36 700	757 500	(2 300)	755 200
E. Administrative services					
1. Administration	1 061 800	31 200	1 093 000	50 300	1 143 300
2. Common services	1 226 500	71 600	1 298 100	56 300	1 354 400
Sub-total	2 288 300	102 800	2 391 100	106 600	2 497 700
F. Other	130 000	-	130 000	20 000	150 000
TOTAL	13 012 000	751 000	13 763 000	986 000	14 749 000
Source of Funds:					
Regular Budget	10 477 000	774 000	11 251 000	916 000	12 167 000
Operational Budget	2 535 000	(23 000)	2 512 000	70 000	2 582 000
TOTAL	13 012 000	751 000	13 763 000	986 000	14 749 000

Fig. 1 COMPARISON OF PROGRAMME COSTS FOR 1968 AND 1969



A Policy-making organs
B Executive management and technical programme planning
C 1 Technical assistance and training
C 2 Food and agriculture
C 3 Life sciences
C 4 Physical sciences
C 5 The Laboratory
C 6 The Trieste Centre
C 7 Nuclear power and reactors
C 8 Health, safety and waste management
C 9 The Monaco Laboratory
C 10 Information and technical services
C 11 Safeguards
D Service and support activities common to a number of programmes
E 1 Administration
E 2 Common Services
F Other

D. THE BUDGET

16. Reference to certain presentational changes in the budget has already been made in paragraph 10 above. With regard to the proposals to combine certain Regular Budget Appropriation Sections, it will be noted that although the costs of the General Conference and the Board of Governors now appear in one Section, their respective costs are still separately identified as sub-items in the budget. Similarly, although the costs of special missions are no longer the subject of a separate appropriation, they are shown and their need is explained separately.

17. The addition of a new Section, however, requires some comment. The Appropriation Section entitled "Scientific and technical services and laboratory charges" has, over the years of the Agency's budgetary history, been used to cover a large variety of items of expenditure and, in consequence, it has grown to a size which makes a division of the various purposes desirable. It is accordingly proposed to remove from that Section the operational activities, such as the Seibersdorf and the Monaco laboratories and the International Centre for Theoretical Physics, to the financing of which the Regular Budget has for several years contributed. Apart from the separation of their costs from those relating to research and technical contracts, the proposed change seems to have the additional advantage that a better cohesion both in the programme and in the budget is thereby achieved, in that the programme descriptions and the budgetary explanations relating to these operational activities now appear in the programme, and the budget only summarizes the financial requirements explained in detail in the programme, irrespective of the source of funds.

18. As a result, the pattern of Regular Budget appropriations and Operational Budget allocations is as set out in Table 2 below, which shows comparative figures for 1968, 1969 and 1970.

Table 2

Appropriation Section	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimates $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
1. Policy-making organs	568 500	-	568 500	21 500	590 000
2. Panels and committees	200 000	-	200 000	10 000	210 000
3. Seminars, symposia and conferences	155 000	(10 000)	145 000	-	145 000
4. Distribution of information	216 000	(10 000)	206 000	24 000	230 000
5. Scientific and technical services	947 000	88 000	1 035 000	133 000	1 168 000
6. Salaries and wages	4 488 500	518 500	5 007 000	408 000	5 415 000
7. Common staff costs	1 699 000	178 000	1 877 000	139 000	2 016 000
8. Duty travel and missions	296 000	(20 000)	276 000	54 000	330 000
9. Representation and hospitality	35 000	2 000	37 000	2 000	39 000

Appropriation Section	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimates $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
10. Common services, equipment and supplies	779 000	16 500	795 500	8 500	804 000
11. Operational facilities	963 000	11 000	974 000	96 000	1 070 000
12. Contingent extra-ordinary expenditures	130 000	-	130 000	20 000	150 000
Total Regular Budget	10 477 000	774 000	11 251 000	916 000	12 167 000
Operational allocations					
1. Seibersdorf Laboratory	229 500	13 500	243 000	15 000	258 000
2. The Trieste Centre	417 500	(32 500)	385 000	25 000	410 000
3. The Monaco Laboratory	45 000	-	45 000	-	45 000
4. Technical assistance and training	1 843 000	(4 000)	1 839 000	30 000	1 869 000
Total Operational Budget	2 535 000	(23 000)	2 512 000	70 000	2 582 000
UNDP	1 225 049	-	pro memoria	-	pro memoria
GRAND TOTAL	14 237 049	751 000	13 763 000	986 000	14 749 000

19. A few remarks need to be made about the compilation of the estimates for 1969-1970 and their comparison with those for previous years. While every effort has been made in the programme to identify costs with relevant activities, it is inevitable that in the absence of certain exact statistical data, a degree of estimation has had to be applied in certain cases. If, as stated above, a computerized accounting system can be established as from 1970 or 1971 onwards, its versatility will be exploited to the full for the purpose of providing such data as will permit more and more exact cost determination in future years, both retroactively and for advance budgeting.

20. A minor increase of $2000 is proposed in the overall provision for hospitality, which has remained at $10 000 for a great number of years and has proved progressively more inadequate. With collaboration between agencies, consultation with governmental bodies and similar contacts becoming more frequent and extensive, responsible officers in operating Divisions who have to maintain and foster the essential liaison with their counterparts elsewhere should not be handicapped by the absence of the comparatively modest sums which are needed to smooth these contacts. Those Divisions which organize meetings have found that the modest sum needed to bring a group together at a simple social gathering for informal but important personal contacts can be extremely beneficial and add considerably to the value of its discussions. The total provision for hospitality, which represents no more than one-tenth of 1% of the total budget, has therefore been spread over several programmes where the need seems justified and where past experience provides some guidance.

21. The estimates for "Panels and committees" are based on an average cost per meeting of $6500, which is based on the experience of recent years.

22. Finally, some explanations concerning the estimates for staff costs will be useful. For Professional posts, the salary scale approved by the General Assembly of the United Nations and the Board of Governors as of 1 January 1966 has been applied and, based upon the pattern of annual departures and arrivals of Professional staff, the necessary increments have been added. For new posts, the same scale has been applied, but it has been assumed that there will be an average delay in the recruitment for new posts of about eight weeks and the annual provision for such new Professional posts has therefore been reduced by $70 748, equivalent to approximately 15%.

23. The situation with regard to General Service category staff is slightly different. An average salary figure of $3000 was used in the budget for 1968; this provided for an increase by 3.4%. However, the increase which the Board, on the basis of wage and cost-of-living indices, approved on 1 January 1967 amounted actually to 6.67%, whereby the average GS salary payable in 1967 rose to $3100. On 1 January 1968 the Board saw itself obliged to follow the rising tendency in the indices which provide the basis for the system of best prevailing local rates, by making a further adjustment in GS salaries by 7.2%, so that the average GS salary payable in 1968 rises to $3325. This figure has accordingly been used also to determine the cost of GS salaries in 1969, but the possibility must be borne in mind that a further rise by at least 5% - lifting the average GS salary to $3500 - may become effective by January 1969; if this occurs, the estimates for 1969 for this item will be too low by approximately $67 000. Likewise, if a similar increase of GS salaries becomes effective by January 1970, the estimate for 1970 will be too low by approximately $70 000. Such an eventuality would necessitate partial utilization of the budgetary provision for contingent extraordinary expenses under Appropriation Section 12.

24. A similar situation exists with regard to posts in the Maintenance and Operatives Service category, where the budgetary provision for 1968, based on an average salary of $1710 per year, has been overtaken by an upward adjustment, as for GS salaries, of 6.67% on 1 January 1967 and a further 7.2% on 1 January 1968. Consequently, the figure used in the estimates for 1969 is $1950, and on the assumption of a further rise by 5% in 1970 the average for that year may reach $2050. Again, it is not unlikely that the estimated further increase by 5% will take place twelve months earlier than estimated, in which case an extra $100 per M&O post, or $12 000, will have to be found in 1969. An additional amount of approximately $12 000 will be required in 1970 if a revision of M&O salaries becomes effective in January 1970. This sum would have to be drawn from the contingency provision under Appropriation Section 12.

25. Table 3 below summarizes the average salaries included in the budget as compared with actual and projected average salary costs.

Table 3

	1967 $	1968 $	1969 $	1970 $
GS staff				
Budget	2900	3000	3325	3500
Actual/projected	3100	3325	3500	3675
M&O staff				
Budget	1710	1710	1950	2050
Actual/projected	1824	1950	2050	2150

26. With regard to possible shortfalls which may arise during 1968 as a result of the increases referred to above, a contingency provision of $130 000 was included in the estimates for 1968 to meet a possible post adjustment to the salaries of staff in the Professional and higher categories which, at the time the estimates were prepared, was expected to become due early in 1968. This post adjustment has in fact become operative on 1 January 1968 and the total sum provided for contingencies may be needed to cover GS and M&O salary increases plus the post adjustment since it is unlikely that savings can be made by other means in sufficient magnitude to cover total cost increases.

27. If rises in the cost-of-living maintain approximately the same tempo as in recent years, i.e. $3\frac{1}{2}$% to 4% per annum, it appears likely that a further post adjustment will become due by late 1969. It is accordingly proposed to retain the $130 000 contingency provision for this purpose and for GS and M&O salary increases in the estimates for 1969, and to increase it to $150 000 in 1970.

28. With regard to assessments on Member States, the position in 1969, as compared with 1968, is as follows:

Table 4

	1968 $	1969 $	Increase $	Increase %
Regular Budget expenditure	10 477 000	11 251 000	779 000	7.39
Less: Miscellaneous income	313 500	363 500	50 000	15.95
Assessments on Member States	10 163 500	10 887 500	724 000	7.12
Less: Allocation of cash surplus for 1966			179 328	1.92
Net additional assessments for 1969			544 672	5.20

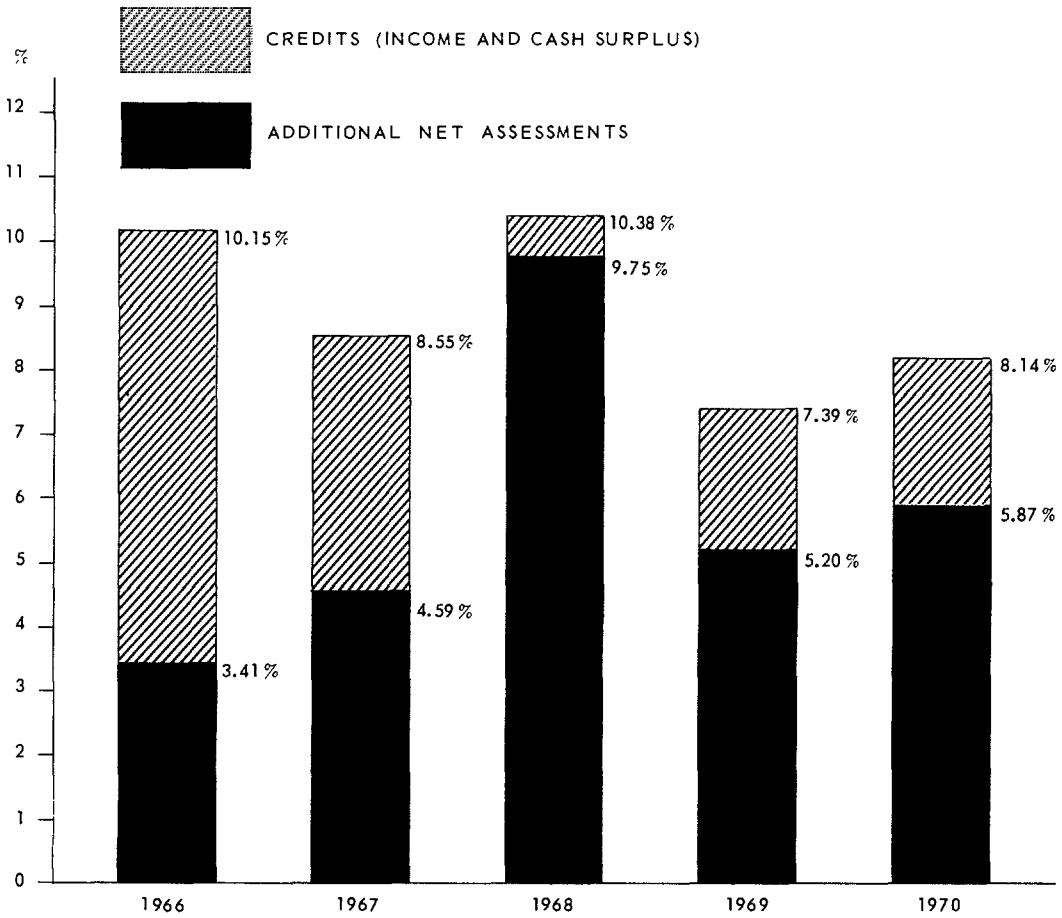
29. Net additional contributions payable by Member States in 1969 will be reduced by the allocation of the final cash surplus for 1966, and will amount to $544 672 which represents 5.2% of the approved budget for 1968. In this connection, it may be of interest to note the comparative budget levels and assessments on Member States over the preceding five years, which are as follows:

Table 5

	Budget $	Miscellaneous income $	Assessments $	Cash surplus $	Net assessments $
1965	7 938 000	225 000	7 713 000	361 437	7 351 563
1966	8 744 000	317 500	8 426 500	535 485	7 891 015
1967	9 491 500	317 500	9 174 000	346 309	8 827 691
1968	10 477 000	313 500	10 163 500	63 690	10 099 810
1969	11 251 000	363 500	10 887 500	179 328	10 708 172

30. Fig. 2 below gives a graphic illustration of the same information in another form. It shows the percentage by which each annual Regular Budget exceeded the previous year's budget, the credits to Member States from increases in casual income and allocation of cash surpluses, and the resulting percentage increase in net contributions payable by Member States. The inclusion in the Figure of the estimated percentages for 1970 represents an attempt to demonstrate the levelling-out process which it is hoped to maintain.

Fig. 2 PERCENTAGE INCREASES IN ANNUAL REGULAR BUDGETS OVER PRECEDING YEARS AND RESULTING ADDITIONAL NET ASSESSMENTS ON MEMBER STATES



31. The Board recommends the General Conference to accept its budgetary proposals for 1969 contained in this document.

II. THE PROGRAMME FOR 1969-74

A. POLICY-MAKING ORGANS

Summary of costs

Table 6

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	323 370	325 000	-	325 000	11 000	336 000
Common staff costs	111 492	118 000	-	118 000	6 000	124 000
Temporary assistance	37 223	40 000	-	40 000	1 500	41 500
Duty travel	137	500	-	500	-	500
Rental of space and equipment	26 259	25 000	1 000	26 000	-	26 000
Common services	31 686	30 000	2 000	32 000	1 000	33 000
Printing and office supplies	19 208	24 000	(3 000)	21 000	2 000	23 000
External audit	6 946	6 000	-	6 000	-	6 000
TOTAL, policy-making organs	556 321	568 500	- 0.0%	568 500	21 500 3.78%	590 000

Programme

Highlights

32. This part of the programme covers the work of the statutory policy-making organs of the Agency, including the annual session of the General Conference and the meetings of the Board and its committees. Based on 1967 experience, it is estimated that no increase will be required in this Appropriation Section in 1969, although some minor shifts between sub-items will be necessary to reflect more accurately in the 1969 estimates the requirements based on 1967 actual cost experience. It is expected that an extra series of meetings of the Board or of a committee or working group thereof may be required in 1970. This, together with a modest increase in prices, and salaries for documentation and language services will cost an additional $21 500 in 1970.

The General Conference

33. Under Article V of the Statute the General Conference consists of representatives of all Members of the Agency and meets in regular annual session and, when necessary, in special

sessions. The Conference elects some Members of the Board; approves States for membership of the Agency; considers the Board's annual report; approves the annual budget of the Agency recommended by the Board and appropriates funds therefor in accordance with a scale of assessments payable by Members which it fixes [4]; approves the Agency's agreements with and reports to the United Nations and other organizations; and approves amendments to the Statute and the appointment of the Director General.

34. The timing and duration of regular annual sessions of the Conference have developed in the past ten years into a pattern which the Board believes is unlikely to change in the immediate future. The total costs of annual sessions are therefore unlikely to vary greatly during the six-year period 1969-1974, except in so far as general rises in the cost of staff and services will occur. It can be assumed that the Conference's sessions in 1969 and 1970 will each last about seven days and that the volume of documentation and the supporting services required for them will be comparable to that of previous years.

The Board of Governors

35. The composition of the Board is prescribed in Article VI.A of the Statute, and the Board is charged by Article VI.F with carrying out the functions of the Agency. It has set up several committees of a continuing character [5]; it also appoints, from time to time and as the need arises, ad hoc committees to deal with specific questions. In recent years the meetings of the Board and its committees have - like those of the General Conference - fallen into a fairly regular pattern which appears unlikely to change much during the years 1969-70, and it is therefore possible to predict that, except for general rises in the cost of staff and services, the annual expenditure on them will equally not change substantially. It is, however, to be foreseen that one or more extra series of Board meetings, or possibly of committee or working group meetings, will be required in 1970.

Explanation of cost changes (1968/1969)

36. The costs charged to policy-making organs of the Agency include the total costs of the Secretariat of the General Conference and Board of Governors, exclusive of interpretation costs, plus a percentage of the costs of interpretation, translation, and documentation services. The percentage is determined by an annual detailed analysis of work-load statistics for these services throughout the Secretariat.

37. On the basis of the latest work-load analysis, charges to this part of the programme for "Salaries and wages" and "Common staff costs" for 1969 represent the percentages shown in Table 7 below.

Table 7

Organization unit	Policy-making organs	Other	Total
Secretariat of the General Conference and the Board of Governors	100.0%	-	100.0%
Interpretation Services	12.0	88.0%	100.0
Language Services	27.0	73.0	100.0
Documents Services	24.0	76.0	100.0

[4] Under Article XIV.D of the Statute.

[5] For example, the Administrative and Budgetary Committee and the Technical Assistance Committee.

38. Although no increases are proposed in the budget for 1969 as compared with the approved level for 1968, some minor shifts between sub-items are suggested to reflect more nearly the actual distribution of costs in 1967. It is also apparent that the cost distributions for 1967 (based on 1966 work-load) resulted in an under-estimate of common staff costs. It now appears that costs for this item may be about $125 000 in 1968 because of changes in emoluments of staff and contributions to the United Nations Joint Staff Pension Fund during the past year. Efforts will be made, however, to economize in order to keep expenditure within the approved budget total, with no change throughout 1969.

B. EXECUTIVE MANAGEMENT AND TECHNICAL PROGRAMME PLANNING

Summary of costs

Table 8

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	152 255	173 000	8 000	181 000	500	181 500
Common staff costs	58 075	65 000	2 500	67 500	-	67 500
Panels and committees	11 665	12 000	-	12 000	-	12 000
Duty travel and missions	13 951	15 000	-	15 000	-	15 000
Representation and hospitality	15 000	15 000	-	15 000	-	15 000
TOTAL	250 946	280 000	10 500 3.75%	290 500	500 0.17%	291 000

Programme

Highlights

39. This part of the programme includes the Office of the Director General, SAC and the Offices of the Deputy Directors General for Research and Isotopes and Technical Operations. The costs of the latter two Offices are left under this programme for reasons of convenience, since they would lose their identity if they were spread over several scientific programmes. The costs of the Offices of the heads of the other Departments are included under the programmes of technical assistance, safeguards, and under administration, respectively. The only changes in costs in the next two years relate to post adjustment, GS salary increases and common staff costs.

Explanation of cost changes (1968/1969)

40. The costs for this programme are estimated to increase in 1969 by 3.75%. No change is expected in the costs in respect of SAC, which are shown under "Panels and committees", nor is any change expected in the annual allocation for "Duty travel and Missions" or "Representation and hospitality". The increases for "Salaries and wages" and "Common staff costs", as explained above, may be summarized and shown in terms of percentages as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$173 000	$181 000	$8000 = 4.62%
Common staff costs	$ 65 000	$ 67 500	$2500 = 3.85%

C. PROGRAMMES OF ACTIVITY

1. TECHNICAL ASSISTANCE AND TRAINING

Summary of costs

Table 9

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Regular Budget:						
Salaries and wages	405 674	424 000	13 400	437 400	5 200	442 600
Common staff costs	156 566	162 300	3 700	166 000	1 000	167 000
Panels and committees	-	6 000	500	6 500	(6 500)	-
Duty travel and missions	8 967	14 700	-	14 700	800	15 500
Representation and hospitality	2 668	2 700	400	3 100	-	3 100
Sub-total, Regular Budget	573 875	609 700	18 000 2.95%	627 700	500 0.08%	628 200
Operational Budget:						
Operating Fund II	1 619 126	1 843 000	(4 000)	1 839 000	30 000	1 869 000
TOTAL, Technical assistance and training	2 193 001	2 452 700	14 000	2 466 700	30 500	2 497 200

Programme

Highlights

41. This programme covers the work of the Department of Technical Assistance, including the Office of the Deputy Director General, the Programme Division, and the Implementation Division, plus the technical assistance projects and the fellowship and

training programmes administered by this Department. In addition to Agency-financed technical assistance, this Department is also responsible for administration and implementation of a substantial segment of the UNDP/TA programme, amounting to about $1 000 000 per year, and several UNDP/SF projects.

42. In order to avoid a continuing gradual decline in resources available for technical assistance, the preliminary 1970 estimate assumes that the $35 000 from Operating Fund II for fellowships at the Trieste Centre will be discontinued and the Agency's total contribution of $150 000 per year in support of this Centre will be charged to the Regular Budget on an equal cost-sharing basis with UNESCO from 1970 on.

43. Since the resources available for Agency-financed technical assistance are not expected to increase during the foreseeable future, the staff and other activity levels of the Department are expected to remain relatively stable during the two-year period 1969-70. The only increases in Regular Budget costs are due to increased emoluments of staff, including a post adjustment in 1969, and the associated increases in common staff costs, partially offset by a reduction in the expenditure for panels in 1970.

The programme for 1969-1970

General

44. The Agency's technical assistance programme, financed from the Operational Budget, is drawn up on the basis of requests from Member States. These are submitted in accordance with a system of integrated programming by which Governments submit their requests in order of priority for the three components of technical assistance, viz, experts, equipment and fellowships and training, and to make the maximum impact on development these three elements are co-ordinated as far as possible. The requests are discussed with the Governments concerned and the final form or content of the total programme resulting from these consultations reflects needs and priorities established by the Governments themselves. These procedures work well and will continue to be used.

45. The magnitude of the programme depends on the resources made available to the Agency. In recent years it has only been possible to meet a little less than one-third of the requests for experts and equipment. If it were possible to transfer all laboratory charges to the Regular Budget, rising costs and increased demands would soon offset the small increase in funds made available for technical assistance. The programme for 1969-1970 as outlined below recognizes this situation and is designed to make the optimum use of the available resources.

Programming and the provision of experts and equipment

46. In the review of the Agency's activities attention was drawn to the chronic lack of resources, and, because only about 70% of the annual target of $2 million actually became available, certain procedures were suggested which might alleviate the situation [6]. These suggestions have been taken into account in planning the management and implementation of the programme. While the procedures for elaborating the programme will remain unchanged, it is intended to lay stress on certain procedures in implementing projects as indicated below:

(a) The atomic energy programmes of Governments receiving technical assistance are in varying stages of development. Some require the advisory services of experts for short periods with or without equipment; others may need the assistance of experts over a longer period. In the former case, particularly, for example in experimental nuclear physics and in industrial applications of radioisotopes,

[6] GC(XI)/362, paras 14-17.

arrangements will be made for short-term visits of one or two months by an expert (who may be an Agency staff member) who, after an initial period, would return to his country leaving the group for which he has been responsible to put his training and advice into practice. He might return after a suitable period and assess the work done, and even pay a third visit later. In this connection, continuing support will be given to proposals for establishing contacts between laboratories in developing and more advanced countries with a view to the provision of the necessary expertise;

(b) A relatively large percentage of requests of Member States reveal a need for long-term assistance, for example in setting up a nuclear facility in a research institute, hospital or university. As more research reactors in developing countries attain criticality, the need for experienced advisers in the initial programming period is evident. With advances in nuclear techniques applied, for example, to food irradiation, radiation entomology and plant production, programmes must be guided through a season and adapted to local conditions with the continuous advice of an internationally recruited expert. It has been demonstrated that in-service training of national counterparts by the expert over a period is often preferable to training in another environment;

(c) In recognizing the varying stages of development of atomic energy programmes, attention will be given to requests for the supply of equipment in the framework of technical assistance projects, in appropriate cases without the services of an expert. Even in those cases where equipment is provided without the services of an internationally recruited expert, it is expected that many Governments may require outside advice for short periods at the installation stage and every endeavour will be made to utilize Agency staff, thereby effecting some financial savings; and

(d) In addition to these proposals, efforts will continue to be made to identify projects of a similar nature within a region which could be serviced by the same expert. It is expected that regional advisers or advisory services will be required in such subjects as the applications of radioisotopes in animal science (East Africa), reactor utilization (South East Asia and the Middle East), industrial applications of radioisotopes (Latin America and South East Asia) and waste disposal (Asia and the Middle East). The feasibility of pilot demonstration projects on a regional basis, for example in radiation entomology and food irradiation will also be investigated. It is expected that the experts carrying out regional advisory assignments or providing advisory services will participate in training courses at the national level and will assist in the formulation and preparation, where appropriate, of regional and sub-regional international training programmes.

47. Experience has shown that the effectiveness of the Agency's assistance, including the co-ordination and integration of all components of technical assistance within Government plans, is greatly enhanced by regular visits of small missions of one or two staff members. In addition to carrying out consultations concerned with the implementation of projects in the operational programme, the missions discuss with the authorities concerned the details of projects requested under the Agency-financed Programme and under UNDP/TA or UNDP/SF, gather information on regional projects of interest to Member States and give advice on the formulation of national atomic energy programmes in the light of a new procedure of programming under UNDP/TA,

which will start in 1969. The basic change involves discontinuation of biennial programming in favour of a system of continuous programming under which requests for technical assistance projects would be submitted as and when the need arose. They would be formally approved every six months. In order to ensure the maximum participation of atomic energy activities in this programme and in UNDP/SF and their orderly integration with Agency-financed projects, it is planned to send missions from time to time, as required, to the regions in which the greatest need exists, as demonstrated by requests received and indicated by the progress made in implementing current programmes.

48. The Agency is acting as executing agency for three projects under UNDP/SF and expects to do so in 1969 and in 1970 in respect of one or two more projects which are now under consideration. It will also continue to act as a sub-contractor in UNDP/SF projects for which other United Nations organizations are executing agencies.

Training and exchange

49. The Agency awards fellowships only for specialized training in nuclear science and its applications. It does not provide for training in the basic sciences or for full academic studies leading to a degree. Requests for such training are transferred to UNESCO. However the Agency does help, and will continue to do so, in those cases where the acquisition of a degree can readily be combined with the training programme arranged. Over 3000 fellowships have now been awarded by the Agency, and it is anticipated that about 300 will continue to be awarded in each year.

50. In compliance with the resolution passed by the General Conference as its tenth regular session [7] recommending close co-operation with ILO and UNESCO, particularly concerning the training of technicians and the teaching of nuclear science in developing countries, it is expected that in 1969 and 1970 greater emphasis will be placed on training of technicians. Further courses are planned along the lines of the Inter-regional Training Course on the Maintenance and Repair of Nuclear Electronic Equipment, held in Turin, Italy, in 1968 in co-operation with ILO. Assistance will also continue to be given to UNESCO in the matter of raising the level of scientific education in the developing countries, and it is expected that following the Bangkok panel of experts on nuclear science teaching in 1968, a panel will be convened in 1969 to identify specific instances where the Agency's expert advice and assistance will be of value in incorporating nuclear science topics into curricula at the secondary school and early university level. It is anticipated that co-directors for UNESCO-sponsored courses on subjects of mutual interest will be provided. It is expected that close co-operation will continue to be maintained with WHO in courses of mutual interest, in particular in regard to radiation accidents in which a course is planned for 1969 in Iran.

51. Efforts will be made to award a greater proportion of fellowships to those who will return and teach others, in order to provide increasingly extensive benefits through the Agency's assistance. To this end, Member States will be encouraged to nominate more teachers for fellowships.

52. Since the beginning of its activities the Agency has frequently reviewed its methods for evaluating, awarding and processing fellowships, and a high degree of efficiency and simplification has been reached during the last few years. Nevertheless, some delays in processing awards continue to occur, a major one being the difficulty in obtaining placement in a host country. In order to expedite this process, consideration is being given to submitting applications to more than one host country when there is reason to believe the response will be delayed. Efforts will continue to be made to streamline procedures further. It must be borne in mind, however, that under an integrated programme it is most important that the timing of actual placement and the

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[7] GC(X)/RES/215.

duration of training of fellows be carefully co-ordinated with the provision of expert services and equipment or with the implementation or progress of the relevant projects.

53. The Agency will continue to exploit the possibilities of the resources offered in kind (Type II fellowships) by regularly distributing detailed information and will also take steps to obtain more of these offers for specialized and advanced training.

54. The Agency continued to receive many requests and suggestions for the organization of training courses, seminars, and study tours in 1969-70; it is expected, however, that funds for only some ten courses and about two study tours each year will be available.

55. The Agency also receives many requests for the services of visiting professors at centres or institutes concerned with the nuclear sciences; it is expected that funds will be available for some 20 such experts each year.

56. The Agency will continue to offer scientific visits to scientists from developing countries to enable them to visit nuclear centres in more advanced countries for the purpose of studying the development of nuclear science and technology, organizational aspects and functioning of special services, training programmes and schools in nuclear sciences, and observing research activities in their field of interest. Research fellowships will also continue to be awarded to scientists who have considerable research experience and are already working on promising research in their own countries. The purpose of these fellowships, as in the past, would be to provide scientists with the opportunity to enlarge their experience and to work out their projects in laboratories in association with highly qualified specialists.

The programme for 1971-1974

57. During 1971-1974 it is expected that the programme will follow the same general lines as indicated above, but its nature and content are, of course, subject to the availability of resources contributed by Member States.

Explanation of cost changes (1968/1969)

58. As may be seen from Table 9 above, total Regular Budget costs for the technical assistance and training programme are expected to increase by $18 000 or 2.95% in 1969 as compared with the approved budget for 1968. The reasons for the various cost changes are given below in respect of each object of expenditure.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$424 000	$437 400	$13 400 = 3.16%
Common staff costs	$162 300	$166 000	$ 3 700 = 2.28%

59. As indicated in the manning table in Annex II, the staff of the Department of Technical Assistance is made up to 26 Professional and 31 GS staff members. No change is expected in this complement of staff. The estimated cost increases are based on salary increases already approved for GS and M&O staff effective as from 1 January 1968 and a post adjustment for Professional staff which becomes effective in 1968. Neither of these increases were provided for in the 1968 budget.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$23 400	$24 300	$900 = 3.85%

60. All other items of expenditure are expected to increase by only $900 in 1969 as compared with the approved 1968 budget. This change represents minor increases of $500 for a panel meeting, and $400 for the increased cost of hospitality.

2. FOOD AND AGRICULTURE

Summary of costs

Table 10

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	153 234	165 800	9 200	175 000	16 000	191 000
Common staff costs	56 590	60 900	3 100	64 000	6 000	70 000
Panels and committees	17 905	29 500	(3 500)	26 000	-	26 000
Seminars, symposia and conferences	10 810	18 000	(1 500)	16 500	-	16 500
Scientific and technical services	222 820	192 000	-	192 000	12 000	204 000
Duty travel and missions	18 085	19 800	200	20 000	1 000	21 000
Representation and hospitality	800	1 000	-	1 000	-	1 000
TOTAL	480 244	487 000	7 500 1.54%	494 500	35 000 7.08%	529 500

Programme

Highlights

61. The Joint FAO/IAEA Division carries out a programme, the main aim of which is to assist and advise Member States in the improved utilization of radiation and isotopes in food and agriculture. The specific activities of the Division are explained in detail below but, in summary, comprise six fields, namely, soil fertility, insect eradication, pesticide residues and food protection, plant breeding and genetics, animal production and health, and food preservation. Assistance to Member States is generally provided by means of special missions, training courses, regional seminars, distribution of information based on results of panel meetings, symposia or conferences, provision of short-term experts, research contracts or publication of manuals for guidance.

62. During the two-year period 1967-1968 the Joint FAO/IAEA Division will increase its laboratory activities by construction of a pilot plant fly-rearing facility in conjunction with the Seibersdorf Laboratory. With this new facility it will be possible for the programme on insect eradication by means of the sterile male technique to be expanded to cover the tsetse fly, codling moth, and perhaps the rice stem borer and mosquito in addition to the Mediterranean fruit fly and olive fly. In 1969-1970 the programme emphasis under soil fertility activities will have shifted from maize and rice to other important crops such as wheat and tree crops. Activities relating to the other fields of study and service will continue along the same lines as in the past.

63. During the next two-year period 1969-1970, the Joint FAO/IAEA Division will not expand its staff or increase its costs to any great extent. The minor increase in cost in 1969 is due to increases in emoluments of staff and the associated common staff costs, partially offset by a reduction in the estimated cost of panels. The expected increase in the preliminary estimate for 1970 is to cover the addition of one Professional and one GS staff member as well as cost increases in connection with research contracts in support of the food and agriculture programme.

General

64. The Joint FAO/IAEA Division carries out a single joint programme on behalf of both FAO and the Agency. Emphasis is placed on projects of practical benefit to agriculture in developing countries and an increase in food supplies. The scientific staff of the Division arranges meetings of experts, gives advice to Governments, prepares technical publications, and assumes responsibility for all activities involving the use of radiation and isotopes in food and agriculture, including technical assistance projects, training courses, fellowships, research contracts, symposia and the Agency's Laboratory programme. Programmes are developed and carried out in consultation, as appropriate, with the relevant Divisions in both organizations. The Division is entrusted with the technical responsibility for the execution of a UNDP/SF project concerning nuclear research in agriculture in India. The project, which involves the establishment of a nuclear research laboratory and support of nuclear research in soil, plant and animal science, as well as in entomology in four institutes in India, was initiated in 1968 and will continue for five years. Broadly speaking, the work of the Division falls into the following main activities:

(a) The programme on the use of isotopes and radiation in soil fertility, which is concentrated on the efficient use of fertilizers; the initiation of programmes in wheat fertilization in the Near East and Latin America and tree fertilization in Africa and South East Asia will result in a decrease of the effort devoted to rice and maize fertilization. The efficiency of water use with particular reference to irrigation, as elucidated by nuclear techniques, will continue;

(b) The insect eradication and pest control programme, which will continue to emphasize the sterile male technique through co-operative studies and demonstration projects under UNDP and in collaboration with the FAO Division of Plant Production and Protection, and an overall programme of integrated pest control;

(c) The work on pesticide residues and food protection, which will be carried out in collaboration with FAO and WHO; the compilation of world-wide data on dietary levels of natural and artificial radionuclides for the UNSCEAR will be continued;

(d) The plant-breeding and genetics programme will, in collaboration with the FAO Division of Plant Production and Protection, continue to emphasize the proper use of induced mutations to supplement existing methods; ten new mutation-produced varieties were released to farmers during the previous two-year period, thus providing an example of the practical implementation of such programmes. The joint effort with the Divisions of Nuclear Power and Reactors, Research and Laboratories and Life Sciences on standardization of neutron seed irradiation has resulted in the establishment of suitable facilities in swimming-pool reactors;

(e) Under the programme relating to animal production and health, support is being given to the development of radiation vaccines for other helminths, while the work on isotopes in studies of magnesium and trace element metabolism is being extended; and

(f) The food preservation programme concentrates on aiding in the solution of legal, microbiological and technical problems related to approval of irradiated foods; this involves close collaboration with WHO.

Soil fertility, irrigation and crop production

65. The existing co-ordinated programmes on the use of isotopes and radiation in studies of water use efficiency and tree crop fertilization in Africa and South East Asia will be continued. The co-ordinated programme on plant nutrient supply and movement will be modified into a programme on physical-chemical relationships in soil and plants. A new programme on the use of isotopes in studies of wheat fertilization in the Near East and Latin America will be initiated to replace similar programmes for rice and maize which are being terminated. This programme will give due consideration to the effect of soil moisture on fertilizer utilization.

66. In conjunction with the International Rice Commission Working Party on Soils and Fertilizers a programme will be initiated to continue the periodic meetings of the research scientists in the rice programme in order to encourage the excellent co-operation initiated. The Laboratory will continue to support the co-ordinated programmes by preparing the isotopically labelled fertilizers, making routine analysis of plant and soil samples from field experiments, providing training in laboratory techniques required, and conducting laboratory and greenhouse studies to supplement the field experimentation. The Joint Division will co-operate with other technical Divisions of FAO and the Agency in studies of the use of desalted sea-water for irrigation, and in other hydrological studies.

The programme for 1969-1970

67. Activities proposed for 1969 include:

(a) Research co-ordination meetings of:

(i) Investigators from nine countries currently participating in the programme on on the use of isotopes and radiation in studies of water use efficiency;

(ii) Participants in the programme on the use of isotopes in studies of wheat fertilization; this programme, which was initiated in 1968 and replaces the maize fertilization programme, gives due consideration to the effect of soil moisture content on fertilizer utilization. Most of the participants are in Latin America and the Near East; and

(iii) Participants in the programme on the use of isotopes and radiation in the study of physical-chemical relationships in soils and plants; this programme, which is carried out mainly through research agreements, emphasizes the factors affecting the behaviour of nutrient ions in the soil and their uptake and assimilation by the plant;

(b) A training course on the use of isotopes and radiation techniques in soil physics and irrigation studies, subject to funds being available.

68. Activities proposed for 1970 include:

(a) Research co-ordination meetings on:

(i) The tree crop fertilization programme; studies currently being carried out on oil and coconut palms, citrus, coffee, cocoa and olive should lead to a better understanding of fertilizer placement for these crops. Most of the participants are in Africa and South East Asia;

(ii) The programme on the use of isotopes and radiation in studies of water use efficiency; it is foreseen that this meeting will review the achievements of this programme before it is integrated with that on wheat fertilization in the following two-year period; and

(iii) The programme on the use of isotopes in studies of wheat fertilization;

(b) A regional seminar (Middle East) in conjunction with a research co-ordination meeting on the use of isotopes and radiation in studies of cereal crop production; topics will include the use of labelled fertilizers for fertilizer use efficiency studies, the use of the neutron moisture meter for water use efficiency studies, and the principles of mutation plant breeding; and

(c) A training course on the use of isotopes and radiation techniques in studies of soil/plant relationships including forestry, subject to funds being available.

The programme for 1971-1972

69. During the two-year period 1971-1972 it is planned that assistance will be given in the use of isotopically labelled fertilizer to study efficiency of fertilizer uptake in a number of additional important crops. With the increased application of the major nutrients and the resulting higher crop yields the need to investigate and solve problems arising from deficiency of micronutrients will become more urgent. The intensification of cultivation will increase the need for quantitative evaluation of production factors, such as can be done with isotopes. There will also be a need for more studies of water economy, in which the determination of soil moisture by the neutron moisture meter is expected to play a growing role. Developments in forestry will require attention.

70. Specific activities at present planned for 1971-1972 include the following:

(a) The co-ordinated wheat fertilization programme will be continued and integrated with the programme on water use efficiency, to reflect the growing awareness that fertilizer use efficiency is closely associated with the problems of effective water use; co-ordination meetings will be held as required;

(b) The tree crop fertilization programme will have operated for approximately four years, and a co-ordination meeting will be necessary to review progress towards the publication of the results, including practical recommendations, and the subsequent direction of the programme;

(c) A symposium on the use of isotopes and radiation in soil physics, irrigation and drainage will be held in 1971 to review developments since the previous meeting in 1967;

(d) A co-ordination meeting combined with a panel dealing with the programme on the use of isotopes and radiation in the study of physical and chemical relationships in soils and plants will pay particular attention to problems concerned with micronutrients in the soil-plant system;

(e) Following study and recommendations by a panel, a co-ordinated programme on the use of isotopes to study fertilizer and water use in protein-rich crops will be initiated;

(f) In association with the Working Parties of the International Rice Commission a regional seminar on the use of isotopes and radiation in rice production studies will be held in South East Asia. This will also deal with plant breeding and genetics and will provide an opportunity for following up the considerable work the Agency has encouraged in that area;

(g) A panel of experts will consider progress and advise on the further use of isotopes and radiation in forestry, e.g. fertilization, physiology, water relations and timber studies, etc.;

(h) A panel of experts will review progress in the use of isotopes and radiation techniques in soil microbiological studies;

(i) A symposium on the use of isotopes and radiation in soil chemistry and plant nutrition will be organized in 1972;

(j) In co-operation with the Department of Forestry of FAO, it is planned to hold a symposium on the use of isotopes and radiation in forestry and forest industries;

(k) In collaboration with the Land and Water Development Division of FAO, efforts will continue towards the international standardization of procedures for field-greenhouse-laboratory fertility and water experimentation;

(l) If developments warrant it, a panel of experts in the use of isotopes and radiation in microclimatology will be convened; work in this field is comparatively limited, but may be of increasing interest; and

(m) If funds permit, consideration will be given to extending the programmes relating to fertilizer use efficiency to a number of additional cash crops.

The programme for 1973-1974

71. An indication of future trends of the programme during the two-year period 1973-1974 is given below:

(a) Co-ordinated programmes using isotopes and radiation to study and develop the most efficient practices for fertilizer and water use will be continued; specific programmes will depend upon developments prior to 1973, but efforts will be continued to:

(i) Integrate the fertility and moisture studies;

(ii) Develop improved and standardized experimental procedures for co-ordinated field-greenhouse-laboratory experimentation;

(iii) Develop a co-ordinated programme to study efficient fertilizer and water use for protein-producing crops.

The regular meetings of co-operators to co-ordinate these programmes will be continued. The co-ordinated programme on physical and chemical relationships in soils and plants will be continued;

(b) Symposia and panels will be convened to review developments in different subjects and to advise concerning the use of isotopes and radiation in experiments designed to increase the efficiency of food production in developing countries, special attention being given to developments in forestry, horticultural crops and oil-producing crops.

Insect eradication and pest control

72. This programme is primarily concerned with all aspects of the sterile-male technique for eradication or control of noxious insects, ticks and mites, as well as the use of radioisotopes for ecological studies. The co-ordinated programmes on the use of the sterile-male technique will be continued; they include both animal and plant insect pests. Collaboration will be maintained with the Plant Production and Protection Division of FAO and the Vector Biology and Control Division of WHO. The preparation and distribution of the Information Circular will be continued, as will co-operation and assistance with the publication in the Agency's Bibliographical Series of "Radioisotopes and Ionizing Radiations in Entomology".

73. Research related to the use of the sterile-male technique for the eradication or control of the codling moth, two species of rice stem borers, and the tsetse fly will be encouraged. Studies will also be encouraged on other insect pests to determine whether the sterile-male technique may be applicable for control or eradication. Particular emphasis will be placed on stimulating the use of this technique for the eradication of the Mediterranean fruit fly from isolated areas.

The programme for 1969-1970

74. Activities proposed for 1969 include:

(a) Research co-ordination meetings on the application of the sterile-male technique for the control of insects attacking plants; this programme will continue to be carried out through research contracts and co-operation agreements for work on fruit flies, codling moth, and other fruit insect pests;

(b) An expert panel, financed by FAO, on the use of isotopes and radiation in relation to the control of rice insects; this panel will help to review current activities and to establish priorities and methods of attack; and

(c) A training course on radioisotopes and radiation in entomology, subject to funds being available. This training course is of considerable importance because the shortage of entomologists in developing countries trained in these techniques retards the development of effective programmes.

75. Activities proposed for 1970 include:

(a) A panel of experts on the use of isotopes and radiation in plant pathology and breeding for disease resistance to be convened jointly with the Plant Breeding and Genetics Section of the Division;

(b) An expert panel to appraise the use of radiation as a sterilant in insects and ticks, considering comparison of gamma radiation, fast neutrons, stages for treatment, different insect groups and related topics;

(c) A research co-ordination meeting to review the programme on the application of the sterile-male technique to the control of harmful insect species;

(d) A symposium on the use of isotopes and radiation in entomology; developments should warrant another general symposium by that time;

(e) In a selected Mediterranean area, an island pilot and demonstration eradication project dealing with the olive fly, in which the sterile-male release technique will be used; if successful, it will be followed by a demonstration on a larger scale;

(f) A relatively small-scale demonstration of eradication of the codling moth with the sterile-male technique in an isolated area; the necessary research to prove the effectiveness of this technique has been completed;

(g) Increased training of individuals in the sterile-male technique and increased assistance to Member States in its application, which will be made possible with the new facilities of the Laboratory; and

(h) In response to requests from Member States, a review of the feasibility of applying the sterile-male technique to the control of weaver birds and the desert locust.

The programme for 1971-1972

76. The activities planned for the two-year period 1971-1972 follow logically from the work of 1969-1970, but it may be expected that with greater awareness of the possibilities of the sterile-male technique for insect control, there will be increasing requests for technical advice and for pilot and demonstration projects. Work may be extended to additional insect species. Training and the provision of information will continue as priority items.

77. Specific proposals for the programme during 1971-1972 include:

(a) A panel of experts to review progress on practical applications of insect control by the sterile-male release technique; considerable practical experience concerning a number of insect species will have accumulated by that time;

(b) Continuation of the pilot projects to evaluate the feasibility of eradication or control of the olive fly and codling moth by the sterile-male technique;

(c) A symposium on the application of isotopes and radiation to entomology, with emphasis on the genetic effects of radiation and chemosterilants on insects, mites and ticks;

(d) An expert panel to examine ecological factors related to the application of the sterile-male technique to insects affecting plants, such as the olive fly, codling moth and the rice stem borer;

(e) A panel of experts on the use of isotopes in insect physiology with special reference to the mode of action of pesticides;

(f) The continued provision of technical advice and support in respect of full-scale control projects relating to the Mediterranean fruit fly; and the convening of research co-ordination meetings, as required, on the programmes on the application of the sterile-male technique to the control of insect pests of animals and other harmful species of insects; and

(g) A training course on isotopes and radiation in entomology with special reference to control techniques involving mass culture, sterilization, and release of insects, subject to funds being available.

The programme for 1973-1974

78. With regard to future trends, particularly during the two-year period 1973-1974, it is expected that, with the proven effectiveness of the sterile-male technique for eradication and control of various species of insects, Member States will request advice and assistance in developing new projects. Furthermore, the Agency expects to continue and increase its efforts to assist and advise on projects dealing with the extension of this technique to control other pests of economic importance. It is expected that regional programmes aimed at eradication or control of various insect pests will be under way and will require assistance and technical guidance. The preparation of a technical manual on the various aspects of the application of the sterile-male technique to practical problems of insect control will be given priority; this will be a contribution to training and exchange of information, which will also be furthered through training courses and symposia.

79. Progress in the application of the sterile-male technique to the control of animal insect pests, particularly the tropical ox warble, the tsetse fly and the horn fly, will be reviewed to determine the future direction and emphasis of this programme and the pos-

sible initiation of small pilot projects. Increased emphasis will be placed on the use of isotopes and radiation, including activation analysis, in ecological studies. Training courses will continue, with emphasis on methodology. The use of radiation to study insect genetics will be encouraged and assisted.

Pesticide residues and food protection

80. The use of radiation and radioisotopes for assay of pesticide residues and their metabolites and their movement through the ecological system has been studied extensively in some laboratories. These new methods, while offering unique approaches as a research tool, also provide in some cases the only approach by which the extremely low maximum permissible concentrations in foods can be assayed. A panel recommended in 1965 that the Agency should disseminate information on this subject, particularly for the benefit of less-developed countries. The collection of available data will be carried out in association with the FAO Committee on Pesticides and the FAO/WHO Working Party on Pesticide Residues.

81. Annual reports on global surveys of dietary levels of fall-out radionuclides will continue to be submitted to UNSCEAR for the assessment of the hazard to man from this type of exposure. Dietary contamination levels declined during the period 1964/1967, but nuclear weapon tests in 1967 may cause some increase in environmental contamination, the extent of which will have to be determined.

The programme for 1969-1970

82. The following is a résumé of activities proposed for 1969:

(a) The Agency will co-sponsor and participate in a Joint IUPAC/FAO/IAEA/WHO Symposium on Chemistry and Metabolism of Terminal Pesticide Residues, which, in part, will deal with radiation and radioisotopes;

(b) Following a review, a revised manual of technical advances by a panel of experts will be published on radiochemical analysis for trace amounts of radionuclides in biological materials, as required for environmental surveys;

(c) In collaboration with the Agency's Laboratory at Monaco and, if necessary, an outside consultant, the knowledge of the effects, actual and potential, on fisheries and marine resources caused by contamination of the marine environment by radioactive substances will be reviewed as part of the co-operation of the Joint FAO/IAEA Division with the Department of Fisheries of FAO in preparation for a conference on pollution of the sea and its effects on fisheries and marine resources planned by FAO in 1969; and

(d) A consultant group will consider the question of reinstatement of agricultural land after heavy contamination by radionuclides. This has been the subject of considerable research in the civil defence context, and similar contamination situations can arise through accidents in atomic energy establishments. It is proposed to prepare a manual for guidance, as little is known at present on whether it is cheaper to pay compensation for lost agricultural activities or to attempt to reinstate the land.

83. Activities proposed for 1970 include:

(a) Continuation by the Joint IAEA/FAO Division, in co-operation with the Division of Research and Laboratories, of the work on the inter-laboratory comparison of methods of analysis for determination of pesticide residues;

(b) A panel of experts to draft a manual for guidance on the diagnosis and evaluation of chronic low-level radiation doses to farm animals and other animals of economic importance. Such information is not readily available to all countries which may need it in the event of accidents leading to the contamination of agricultural land;

(c) A panel of experts to consider assessment of acceptable levels of radionuclides in the human diet, continuing the work of the 1967 meeting;

(d) A training course on the use of radiation and isotopes in the study of pesticide residue problems, subject to the availability of funds; and

(e) Reporting to UNSCEAR on the continuous survey of dietary levels of fall-out radionuclides, including data on dietary habits in certain countries where diet is based mainly on cereals, if UNSCEAR decides to go ahead with this new programme.

The programme for 1971-1972

84. Work plans for the two-year period 1971-1972 are based on the following considerations: the general interest in pesticide residues is expected to continue for some years and the probable introduction of new pesticides will increase the need for continuing surveillance of this problem by panels of experts, dissemination of accumulated knowledge and the encouragement of field work and training. Future activities of UNSCEAR which have been discussed at its seventeenth session in 1967 will, if initiated, extend into this period and may give rise to requests for further assistance from the Joint FAO/IAEA Division.

85. Specific activities planned for 1971-1972 are as follows:

(a) A symposium on the use of radiation and radioisotopes in the study of pesticide residues and their metabolites will be held;

(b) A panel of experts on the use of isotopes and radiation in studies of pesticides and residue problems will be convened in association with the FAO Committee on Pesticides and WHO;

(c) A panel of experts will review progress in radiochemical methods of analysis;

(d) A co-ordinated programme will be initiated on the use of radioisotopes and radiation in pesticide studies;

(e) Subject to the availability of funds,

(i) A seminar on agricultural and public health aspects of environmental contamination will be organized jointly with other agencies including WHO; and

(ii) A training course on radionuclide surveys in foods will be held in co-operation with WHO;

(f) Commitments to UNSCEAR on the survey of dietary levels of fall-out radionuclides will continue.

The programme for 1973-1974

86. With regard to future trends, particularly in the two-year period 1973-1974, the following general considerations will be borne in mind. The concern over increasing concentrations of an ever widening range of toxic residues in foods resulting from the agri-

cultural use of pesticides and other chemical treatment in the case of crops, animals and foodstuffs, has given rise to widespread studies. There is therefore a need for the continuation of co-ordinated programmes on the use of radioisotopes in pesticide studies, with special attention to the development of new assay and tracer techniques. Panels will be convened to review developments and to disseminate information. Collaboration with FAO and WHO will continue.

87. Expansion of nuclear energy programmes and the construction of large reactors and associated processing plants increase the potential hazards of environmental contamination, both from approved releases and accidental discharges, which will call for continued attention. By 1973-1974, when the atomic energy industry in many parts of the world will have been active for some 30 years, it may be opportune for WHO, FAO and the Agency to carry out a joint review of their activities relating to environmental contamination. It is expected that support for UNSCEAR's activities will continue through this period, particularly if surveys of diets based on cereals rather than milk and meats are initiated in the 1968-1970 period. The Division will therefore continue the estimation of dietary levels of man-made and naturally occurring radionuclides.

Plant breeding and genetics

88. The use of induced mutations has now evolved as a directly applicable tool in plant breeding, and during the past two years ten new plant varieties have been developed by mutation techniques. Eight of the new strains are already available commercially. It is becoming increasingly evident that the induced mutation technique can be used as a valuable complementary tool together with other methods for achieving specific plant breeding goals. The Agency's programme places major emphasis on international co-ordination of effort leading to the more efficient production and use of induced mutations in major food crops. An integrated approach includes support and co-ordination of mutation research, training and technical advice, especially for developing countries. Mutagenic treatment services for the various projects and the training of fellows will be continued by the Laboratory, which also works on the improvement of methods of inducing mutations by gamma and neutron irradiation and their comparison with other mutagens and on the development of better methods of assessing mutagen effect and screening of useful mutations.

The programme for 1969-1970

89. Activities proposed for 1969 include:

(a) Research co-ordination meetings of:

(i) Participants in the co-ordinated rice mutation programme which is carried out in South East Asia and Latin America in association with the FAO International Rice Commission Working Party on Rice Production; the meeting will review the results of the first five years of work; and

(ii) Participants in the FAO/IAEA Near East co-ordinated programme on the use of induced mutations in wheat and barley breeding, in conjunction with the Ninth FAO Ad Hoc Conference on Wheat and Barley Improvement and Production in the Near East; regional trials will be continued;

(b) A Symposium on Induced Mutations in Plant Breeding and Genetics, during which an informal meeting will be arranged of the participants in the co-ordinated programme on the production and use of induced mutations in plant breeding; this group also advises on the general plant breeding and genetics programme of the Division; in co-operation with it and with respective sections of EUCARPIA and SABRAO a Mutation Breeding Newsletter will be circulated, and a list of workers engaged in mutation investigations as well as a list of radiation sources will be prepared;

(c) A joint panel of experts and participants in the co-ordinated research programme on the use of neutrons for seed irradiation and the use of seeds as "biological monitors" for the standardization of absorbed dose, which is conducted by the Division in co-operation with the Divisions of Nuclear Power and Reactors, Research and Laboratories, and Life Sciences; this meeting will be financed by FAO; and

(d) Subject to the availability of funds, a regional training course on seed irradiation.

90. Activities proposed for 1970 include:

(a) Research co-ordination meetings of:

(i) Participants in the FAO/IAEA Near East co-ordinated programme on the use of induced mutations in wheat and barley breeding, in conjunction with a regional seminar scheduled to be held in that region; and

(ii) Participants in the co-ordinated research programme on the use of neutrons for seed irradiation;

(b) A study group meeting in Latin America to consider the use of induced mutations in plant breeding in that region;

(c) A panel of experts to advise on the use of induced mutations for improvement of protein production;

(d) A panel of experts to review the programme on the production and use of induced mutations in plant breeding after five years of operation;

(e) A training course on mutation plant breeding techniques in connection with the co-ordinated rice mutation programme, subject to the availability of funds; and

(f) A small group of consultants to review progress in the use of low-dose stimulation of plant growth.

The programme for 1971-1972

91. During the two-year period 1971-1972 programmes dealing with wheat- and protein-rich crops will be emphasized, with the neutron seed irradiation programme moving from the radiobiology phase to the more practical phase of neutron-induced mutations, and the work will increasingly extend to Latin America and will particularly include aspects of disease resistance. The rice mutation breeding programme will receive moderate attention. Specific activities planned for this period include:

(a) An expert panel to consider maximization of directed mutation induction; the panel will constitute a group of advisers on the whole mutation breeding and genetics programme and will succeed the advisory group of the period 1965-1970;

(b) An expert panel to consider the use of induced mutations for the improvement of industrial crops;

(c) A regional seminar in South East Asia on the use of isotopes and radiation in rice production studies in support of the continued programme on rice mutation breeding under the auspices of the International Rice Commission;

(d) A symposium on the effect of ionizing radiation on seeds together with a co-ordination meeting of the participants in the neutron seed irradiation programme to review the work of the first five years and to plan further radiobiological and mutation studies;

(e) A co-ordination meeting of participants in the FAO/IAEA Near East co-ordinated programme on the use of induced mutations in wheat and barley breeding;

(f) A co-ordination meeting of participants in the programme of plant protection improvement;

(g) The initiation of co-ordinated research programmes on:

(i) The use of induced mutations in breeding for resistance to disease and pests in domesticated plants, including a co-ordination meeting combined with a panel; and

(ii) The use of induced mutations in plant breeding (wheat, maize, potatoes) in Latin America, including a co-ordination meeting combined with a panel;

(h) A training course on the application of induced mutations for improving the quality and quantity of protein in crop plants with emphasis on screening procedure, subject to the availability of funds;

(i) Continuation of the circulation of the Mutation Breeding Newsletter including information about new mutant varieties, bibliography, etc., in co-operation with the appropriate sections of EUCARPIA and SABRAO; and

(j) Continued collaboration with the Division of Plant Production and Plant Protection of FAO in the establishment of the World Plant Germ Plasm Records System, including a catalogue of mutant varieties and useful breeding material.

The programme for 1973-1974

92. With regard to future trends, it is expected that by 1973/1974 the release of crop varieties derived from induced mutations will have sharply increased, with a distinct impact on agricultural production. Improvements will include higher protein content and quality, earlier maturity, shorter and stronger stem, greater disease resistance and higher yield. An increased demand is expected for the support, guidance and co-ordination of research and development. This will be met by continuing and strengthening the co-ordinated research programmes and through the provision by the Laboratory of radiation treatment and training services to participating institutes. It is expected that African countries will by then approach the stage where induced mutations can contribute to their plant breeding efforts; a regional seminar is foreseen.

93. The Division will be increasingly called upon to serve as a centre for various activities in the field of mutation breeding research, such as circulating newsletters, preparing bibliographies, lists and catalogues of workers, radiation sources and useful mutants. The Manual on Mutation Breeding will be revised. Further symposia, study groups, panels and co-ordination meetings will be organized as required. A sharp increase in requests for technical assistance, expert services and training is expected.

Animal production and health

94. Isotopes offer unique advantages in the investigation of selected problems of biochemistry, physiology and nutrition of domestic animals. They are invaluable tools

in research aimed at the elucidation of important questions such as utilization of feed components, metabolism of minerals and organic compounds, synthesis of animal protein from different sources, formation of milk, and metabolic and deficiency diseases. Through research agreements or contracts the Agency supports studies, by means of isotopes, of protein metabolism, and by the use of non-protein nitrogen compounds as a substitute for dietary protein for ruminants and other herbivores, to examine ways of increasing the amount of animal protein available for human consumption.

95. Radiation attenuation of helminthic larvae still appears to be the only means by which vaccines can be produced against certain debilitating helminthic diseases, and commercially produced lungworm vaccines are gaining increasing acceptance in several countries. Work is continuing on the investigation of the possibilities of applying this technique to several other helminths and to certain protozoan diseases. Intensive work is also done with the aid of isotopes on selected questions of host-parasite relationships, e.g. immunology and pathophysiology, a better understanding of which is necessary for vaccine production. Close collaboration is maintained with the Animal Production and Health Division of FAO and with other Divisions concerned in the Agency and FAO, and similar close collaboration will be sought between the Joint FAO/IAEA Division and WHO on parasitic disease control, since many problems of human and animal parasitology are almost identical.

The programme for 1969-1970

96. Activities proposed for 1969 include:

(a) Continued support, through research contracts or agreements, for the co-ordinated programme on the use of isotopes and radiation in studies of the aetiology, effects and control of parasitic diseases, and a research co-ordination meeting, together with a group of consultants, to advise on its development; and

(b) A panel of experts to advise on the application of isotopes to studies of hypoproteinaemic diseases and on the initiation of a co-ordinated research programme on the use of isotopes in studies of the production of animal protein.

97. Activities proposed for 1970 include:

(a) A co-ordination meeting of participants in the programme on the use of isotopes in studies of magnesium and trace elements, which will be continued;

(b) A symposium on the use of isotopes and radiation in animal parasitology; and

(c) An international training course on the use of isotopes in the animal sciences, subject to the availability of funds.

98. In association with the Fishery Resources and Exploitation Division of FAO, a consultant group will review the use of isotopes and radiation techniques in studies of hydrobiology and fish production.

99. Subject to the availability of funds, a regional study group on the application of nuclear techniques to animal physiology and nutrition will be convened in South America.

The programme for 1971-1972

100. Activities planned for the two-year period 1971-1972 are a natural continuation of the programmes previously initiated. Special emphasis will be given to problems of mineral

metabolism, where isotope methods and neutron activation analysis are becoming increasingly important for studying the physiologically important interactions between such elements as copper, cobalt, iron, molybdenum, etc. Support of studies on protein production in ruminants, in which non-protein nitrogen precursors are used, will be continued. Attention will also be given to nuclear techniques in hydrobiology and fish production. In regard to animal health particular attention will continue to be devoted to the combating of parasitic diseases by means of nuclear techniques. Following promising results on radiation attenuation of viruses, it is hoped that a small programme on virus diseases will be initiated.

101. It is expected that the following specific activities will be carried out during 1971-1972:

(a) Research co-ordination meetings of:

(i) Participants in the programme on the use of isotopes and radiation in studies on the aetiology, effects and control of parasitic diseases, together with a meeting of the expert panel on the use of nuclear techniques in the control of parasitic diseases;

(ii) Participants in the programme on nuclear techniques in the production of animal protein;

(iii) Participants in the programme on the use of nuclear techniques in studies of magnesium and trace elements, together with a meeting of the expert panel on isotopes and radiation in animal sciences;

(b) The placing of further emphasis on the study and control of parasitic diseases in tropical and sub-tropical areas through the formation of a group of expert specialists on such diseases within the programme on parasitic diseases; and

(c) Consultants' meetings on:

(i) Virus diseases, to review the contribution of nuclear techniques to the study and control of such diseases;

(ii) A revision of part of the Training Manual on Use of Isotopes and Radiation in Animal Research.

The programme for 1973-1974

102. Expected future trends during the two-year period 1973-1974 include the continuation of co-ordinated programmes involving the use of isotopes and radiation to study and develop methods for the control of debilitating animal diseases. Specific projects will depend upon developments prior to 1973 but efforts will be concentrated on the production of radiation vaccines against helminthic and protozoan diseases and on the study of immunology and pathophysiology of parasitic diseases; efforts will also be made to extend these activities to bacterial and viral diseases of economic importance.

103. In animal physiology and nutrition, emphasis will be given to nitrogen and protein metabolism in herbivorous animals with a view to increased utilization of non-protein nitrogen and low-quality vegetable protein for the production of animal protein, and to the metabolism of mineral elements, in order to find ways to counteract diseases caused by deficiency or excess of certain elements and to avoid disturbances due to interaction between elements in the animal organism.

104. The application of nuclear techniques to hydrobiology and fish production will be given special consideration through a joint programme with the Department of Fisheries of FAO. This will be supplemented by co-ordinated groups of research workers, by symposia to review developments, by co-ordination meetings and expert panels for the exchange of scientific information and advice and the revival of programme activities. Special attention will be given to activities related to the improvement of production of animal protein in developing areas.

Food preservation

105. Food irradiation is gradually becoming a realistic proposition to help preserve the world's food supplies. Radiation can be used for a wide variety of food and foodstuffs and a number of different purposes: to disinfect stored grain and dried or packaged foods, to rid food of health hazards in the form of micro-organisms and parasites, to prolong the normal shelf or market life of perishable food products, and to produce indefinitely stable products. Many pilot plants have already been established or are under construction for larger-scale attempts to introduce this new technique into practical food preservation. Moreover, various irradiated food commodities have received public clearance in a number of countries.

106. The pilot plant for grain disinfestation by ionizing radiation, established under a UNDP/SF project in Turkey, will serve as a basis for an evaluation of the technical and economic feasibility of the process. The Agency will continue to take part in the planning and evaluation work of the International Project on Food Irradiation at the Austrian Reactor Centre of the Oesterreichische Studiengesellschaft für Atomenergie (Austrian Atomic Energy Research Organization).

The programme for 1969-1970

107. Activities proposed for 1969 include:

(a) A panel of experts on radiation disinfestation of stored food, such as grain, dried fruits and vegetables, dried fish, and the packaging of such food (taking into account the results achieved with the pilot grain irradiator);

(b) A panel of experts on the acceptability of certain irradiated food items, in co-operation with WHO, with the objective of facilitating international clearance of irradiated food;

(c) A co-ordination meeting dealing with the programme on the microbiological aspects of food irradiation and the effect of irradiation on the inactivation of toxins, financed by FAO;

(d) An advanced international training course on food irradiation technology and techniques, subject to the availability of funds; and

(e) Establishment of a co-ordinating centre for collecting wholesomeness and legislative data and published information relating to research on irradiated food and feed products, and making such information available to Member States.

108. In co-operation with the Agency's Division of Research and Laboratories and the Forestry and Forest Industries Division of FAO, a special report on the potentialities of irradiated wood-plastic combinations will be prepared.

109. In response to requests, special missions will investigate, make recommendations and advise Governments on prospective pilot plants for the study and demonstration

of the feasibility of food and feed irradiation in the field of radurization, [8] radicidation [9] and radappertization [10]. By 1969 or 1970, demonstration projects with a portable irradiation facility and visiting seminars on the application of irradiation in food preversation will be organized.

110. Activities proposed for 1970 include:

(a) A panel of experts on the inactivation of viruses in meat products by irradiation to follow up the recommendations of the 1967 panel on the elimination by irradiation of harmful organisms from food and feed;

(b) A panel of experts on the role of irradiation in quarantine problems, as irradiation of fresh fruits to control insect infestation is becoming more important and results obtained so far are very promising;

(c) A group of consultants to discuss the results achieved and to give advice and guidance on the application of irradiation in the food industry; and

(d) Continuation of pilot demonstration projects with a portable irradiation facility for the application of irradiation to food preservation, visiting seminars, and the provision of advice to Governments as requested.

The programme for 1971-1972

111. In the planning of activities for the two-year period 1971-1972, account will be taken of the fact that the technology of radiation preservation of food has reached a stage where the technical possibilities of this method should be fully exploited, especially in areas where irradiation offers unique advantages or appears to be economically competitive with traditional preservation methods. International trade in irradiated food and feed products will increase, as clearance has already been given to several irradiated products in some countries and clearance is in preparation in others. Work in 1971-1972 will concentrate on practical applications and priority will be given to the technical and economic aspects of the irradiation disinfestation process, the radurization of fresh fish and fruit and the technical basis for appropriate legislation and clearance of irradiated food.

112. Specific proposals include:

(a) Continuation of pilot projects for the disinfestation of grain and evaluation of the technical and economic feasibility of this process;

(b) Investigations on the establishment of pilot plants for the disinfestation by irradiation of other dry agricultural products such as rice, legumes, tobacco and dehydrated fruits and vegetables; and

(c) Studies at a pilot-scale level of the disinfestation by irradiation to control the widespread infestation of fresh fruit by insects.

113. It is further planned that:

(a) In response to requests, advice and support will continue to be given on prospective pilot plants for food and feed irradiation in the field of radurization,

[8] Radurization is the extension of the market life of food and feed products by ionizing radiation.

[9] Radicidation is the killing of non-spore-forming, pathogenic bacteria in food and feed products by ionizing radiation.

[10] Radappertization is the sterilization of food by ionizing radiation.

radicidation and radappertization, and co-ordination and stimulation of research work on food preservation by irradiation will continue;

(b) An advanced international training course on food irradiation technology and techniques will be held, subject to the availability of funds;

(c) Panels of experts will consider the economics of food preservation by irradiation and advise on the enzymological aspects in food irradiation;

(d) A co-ordination meeting dealing with the research programme on the microbiological aspects of food irradiation, with special reference to bacterial spores will be organized;

(e) Support will continue to be provided to facilitate international agreement on the wholesomeness aspects of food irradiation by the organization of a panel of experts on the acceptability of certain irradiated food items in co-operation with WHO to continue the work done by the panel referred to in paragraph 107 (b);

(f) Study group meetings will be convened in South East Asia and in Africa to consider the use of food preservation by irradiation in these regions;

(g) The Agency will continue to serve as a co-ordinating centre for various other activities in food preservation, such as the collection of wholesomeness and legislative data, lists of radiation sources, published information relating to research, etc., and make such information available to Member States;

(h) In co-operation with the Forest Industries Division of FAO and the Agency's Division of Research and Laboratories, a co-ordinated research programme will be initiated in the developing countries on irradiated wood-plastic combinations; and

(i) An international symposium on food irradiation will be held to review accomplishments and make suggestions for future developments.

The programme for 1973-1974

114. With regard to future trends, i.e. for the two-year period 1973-1974 and beyond, it seems clear that, as with every other innovation, general acceptance of the irradiation process in the food industry will take time. At present four Governments have given clearance for unlimited consumption of certain irradiated foods. It will be necessary for more Governments to give such clearance before there can be a substantial international trade in such products, the most likely of which are believed to be potatoes, onions, grain and flour, strawberries and tropical fruit, fresh fish, chicken, canned hams and sterilized meat products.

115. The testing of irradiated foods through animal feeding and other wholesomeness studies is very expensive. It has been possible to avoid duplication in different countries by making data readily available. It is planned to continue to collect research information and wholesomeness data on irradiated food. The encouragement of effective legislation will remain of prime interest and concern.

116. There will be an increasing need to integrate radiation processing into areas where it can perform useful services that cannot be carried out by any other known method, such as irradiation treatment of hermetically sealed and other packaged material for the elimination of insects, parasites, pathogens, viruses or certain spoilage organisms; sterilization, or the elimination of pathogens or parasites, in blocks or large pieces of food materials that cannot be successfully treated by conventional

processes; the enhancement of flavours or colours in products which cannot be accomplished by other means; and the change of structure or texture of certain foods. Such advances will be encouraged through symposia and panels to review developments and through co-ordinated research.

Explanation of cost changes (1968/1969)

117. As shown in Table 10 above, the total estimated increase in costs of the Joint FAO/IAEA Division in 1969 amounts to only $7500 over the approved budget for 1968. The explanation of these increases may be summarized as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$165 800	$175 000	$9 200 = 5.6%
Common staff costs	$ 60 900	$ 64 000	$3 100 = 5.3%

118. As shown in the manning table in Annex II, the staff of the Division in 1968 is made up of 11 Professional and seven GS staff members. In addition to these 18 staff members financed from the Agency's budget, it is estimated that nine or ten additional staff members will continue to be paid for by FAO. No increase in this staff is planned in 1969. The cost increases are therefore entirely due to increased emoluments of staff, including a post adjustment for Professional staff members which becomes effective during 1968 and a general salary increase for GS and M&O staff members approved by the Board of Governors in February 1968.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$260 300	$255 500	($4800) = (1.84%)

119. The net decrease of $4800 indicated above is due to a decline of $3500 in the estimated costs of "Panels and committees", and of $1500 in the cost of "Seminars, symposia and conferences" partially offset by a $200 increase in "Duty travel and missions". The 1969 estimate assumes that four panels will be held at an average cost of $6500 each. No change from the approved budget for 1968 is expected for "Research contracts" under "Scientific and technical services" or for "Representation and hospitality".

120. In addition to the Agency's expenditure listed in Table 10 above, the work of the Joint FAO/IAEA Division is supported by financial contributions from FAO. The Directors General of both organizations have agreed to recommend to their respective competent organs that the costs of any future expansion of activity, over and above the 1966 level, should be borne equally by each organization. The FAO allocation of funds for the Joint FAO/IAEA Division was increased from $196 875 in 1967 to $233 075 for each of the years 1968 and 1969. The budget for FAO is prepared on a biennial basis; since the contributions for the years 1970-1971 are unknown, no amount can be given for 1970.

3. LIFE SCIENCES

Summary of costs

Table 11

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	218 658	219 000	18 800	237 800	12 000	249 800
Common staff costs	78 892	78 000	6 400	84 400	3 500	87 900
Panels and committees	35 293	31 500	(5 500)	26 000	13 000	39 000
Seminars, symposia and conferences	5 701	14 000	2 500	16 500	5 500	22 000
Scientific and technical services	226 542	234 000	(4 000)	230 000	14 000	244 000
Duty travel and missions	17 143	20 000	(2 000)	18 000	1 000	19 000
Representation and hospitality	850	1 000	-	1 000	-	1 000
TOTAL	583 079	597 500	16 200 2.71%	613 700	49 000 7.98%	662 700

Programme

Highlights

121. This part of the programme represents the work carried out by the Division of Life Sciences through its three sections of nuclear medicine, dosimetry and radiation biology. It remains at about the same level for the next biennial period although some changes in emphasis within the overall programme will be made. The cost increases in 1969 are due to the addition of two new Professional posts. One additional P-3 post is included in the preliminary estimate for 1970 for intercomparison of medical radioisotope techniques, and some provision is made for additional panels, an additional symposium, and for cost increases for research contracts.

Nuclear medicine

122. With progress in science and technology, the applications of radioisotope techniques in clinical medicine and in research in the life sciences continue to grow in number and extent. The Agency will maintain its efforts to assist the introduction and establishment of these techniques in medical radioisotope laboratories throughout the world by providing technical assistance, training facilities and information services by holding conferences and symposia, by promoting research and by developing new instruments and techniques. Particular attention will be given to the needs and interests of the developing countries. Very close contact will continue to be maintained with WHO on all medical and biological aspects of the Agency's work in order to integrate the programmes of the two organizations and, in accordance with an agreement reached in 1966, the Agency's work on medical applications

of radioisotopes will be concentrated on the technical aspects thereof. Liaison will also be maintained with other interested international organizations, notably ICRU, ICSH and IOMP.

123. With the ever-growing number of medical radioisotope laboratories in developing countries, it is expected that requests to the Agency for technical assistance in medical applications of radioisotopes will continue to increase. Many of these requests require the services of an expert for a short period to assist in the installation of equipment and train local staff in its operation. It is planned that such short-term assignments will be undertaken to an increased extent by Agency staff rather than by specially recruited experts.

124. The Agency will continue to grant fellowships and provide or support training courses in applications of radioisotopes in the life sciences. Adequate facilities for the training of physicians in basic radioisotope techniques have already been established in many countries, but with increasing sophistication in techniques there is a need for training at a more advanced level. The Agency will provide this through advanced general courses and also through courses and study tours dealing with specific techniques.

125. In many countries the lack of supporting scientific personnel, especially of medical physicists, is a serious obstacle to the effective development of medical applications of radioisotopes. The problems of recruitment and training of medical radiation physicists were discussed at a Joint IAEA/WHO Expert Committee on Medical Radiation Physics in 1967 and, following its recommendation, the Agency will develop a comprehensive training programme.

126. The Agency's programme of research in applications of radioisotopes in the life sciences will be closely co-ordinated with that of WHO and will be directed towards the development and application of specified techniques rather than towards the solution of specific medical problems. Following the recommendations of a research co-ordination meeting in 1968, in which representatives of WHO participated, emphasis will be given to co-ordinated research programmes embracing research contracts with institutions in developing countries, cost-free research agreements with institutions in advanced countries and supporting work in the Agency's Laboratory. The progress of these programmes will be reviewed at research co-ordination meetings held at appropriate intervals and attended by representatives of participating research groups and by expert consultants.

127. The establishment of medical radioisotope techniques on a routine basis raises problems of standardization. The Agency will play an increasing role in the intercomparison and standardization of such techniques, collaborating with other international organizations such as ICRU and ICSH.

128. As part of its technical advisory services, the Agency will give detailed consideration to the problems of layout, accommodation, staff and equipment that arise in the setting up of small medical radioisotope laboratories.

129. The Agency will continue to compile and circulate a bibliographic guide to recent literature in nuclear medicine at regular intervals. Special bibliographies on restricted subjects relating to applications of radioisotope techniques in the life sciences will also be compiled when required.

The programme for 1969-1970

130. Activities proposed for 1969 are discussed below:

(a) Staff members will continue to participate in advisory missions and will carry out short-term technical assistance assignments to medical radioisotope laboratories in the developing countries during 1969; a detailed register of such laboratories, giving details of their staff, equipment and activities, will be prepared so that Agency support can be as effective as possible;

(b) With the continuing development of medical applications of radioisotopes, there is a corresponding need for advanced training facilities for persons already working in medical radioisotope laboratories. Subject to the availability of funds, it is proposed to organize a fourth advanced training course on medical applications of radioisotopes during 1969. A study tour on in vivo measurement techniques may also be organized;

(c) Following the recommendations of the 1967 IAEA/WHO Expert Committee on Medical Radiation Physics, consultants will be engaged during 1969 to advise on the development of a comprehensive training programme in this field;

(d) The co-ordinated research programme on the use of radioisotope techniques in the study of malnutrition in tropical and sub-tropical regions, initiated during 1965, will be terminated in 1969. That on the use of activation analysis techniques in the study of trace element and mineral metabolism in man will be continued. Following the recommendations of a research co-ordination meeting in 1968, a further co-ordinated research programme on a subject to be chosen will be initiated during 1969;

(e) An extended programme of intercomparison and standardization of medical radioisotope techniques will be initiated during 1969. Consultants will be engaged, where appropriate, to advise on its development. Various intercomparison projects involving the distribution of samples for measurement in a number of participating laboratories will be undertaken in connection with co-ordinated research programmes. Other projects will be carried out in collaboration with ICSH and other international organizations. As part of the Agency's existing collaboration with ICRU on in vivo radioactivity measurements, a panel meeting will be held to discuss the quantitation of radioactivity uptake measurements in body organs;

(f) The estimation of radiation dose received by the patient is an important aspect of any medical diagnostic test involving radioisotopes. New methods of dose computation are now being developed; a panel meeting on the dosimetry of internally administered radioisotopes will be held during 1969 to discuss progress and recommend appropriate supporting activities by the Agency;

(g) Techniques such as radioisotope dilution analysis, radioisotope saturation analysis and radioimmunoassay for the measurement of vitamins, hormones and other substances in vitro have developed rapidly in recent years. A symposium on radioisotope techniques for the measurement of biologically active substances in vitro will be held during 1969, possibly with the co-operation of WHO, to review new developments; and

(h) A research co-ordination meeting will be held to discuss results obtained under the co-ordinated research programme on the use of activation analysis techniques in the study of trace element and mineral metabolism in man and to plan future work. The final report on the co-ordinated research programme on the use of radioisotopes in the study of malnutrition in tropical and sub-tropical regions will be published.

131. For 1970, the activities proposed are discussed below:

(a) The increased participation of staff members in advisory missions and short-term technical assistance assignments to medical radioisotope laboratories in developing countries will continue to the extent permitted by availability of staff;

(b) Subject to the availability of funds, the first of a series of training courses on radioisotope techniques to be held in connection with the Agency's training

programme for medical radiation physicists will be organized during 1970. A study group will also be convened to consider the particular problems of recruitment and training of scientific and technical personnel for medical radioisotope work in a chosen region;

(c) The programme of intercomparison and standardization of medical radioisotope techniques initiated during 1969 will be further developed, and consultants will be engaged as appropriate to advise thereon;

(d) A panel meeting will be held during 1970 to consider the needs of small medical radioisotope laboratories as regards layout, accommodation, staff and equipment. A manual on this subject will be prepared with the help of consultants for guidance in setting up such laboratories;

(e) The number of centres producing labelled compounds for medical use (radiopharmaceuticals) continues to increase. The production of these materials, especially on a small scale, involves many problems of purity and sterility; a panel meeting on the quality control of radiopharmaceuticals will be held to draw up recommendations as to appropriate control procedures. The active participation of WHO in this meeting will be essential;

(f) Dynamic functional studies of uptake, metabolism and excretion of radioactive substances in body organs constitute an important group of applications of radioisotopes in medical diagnosis; and

(g) The technique of liquid scintillation counting continues to advance and becomes more than ever important with the increasing use of compounds labelled with hydrogen-3 and carbon-14 in medical and biological studies. A symposium on liquid scintillation counting techniques in the life sciences will be held to review progress in this technique.

The programme for 1971-1972

132. During 1971-1972 the Agency's programme on applications of radioisotopes in the life sciences will continue along the lines laid down during 1969 and 1970. Agency staff will continue to participate as far as possible in advisory missions and short-term technical assistance assignments.

133. A fifth advanced training course on medical applications of radioisotopes and a training course on radioisotope techniques for medical radiation physicists may be organized. A study group will be convened to consider the particular problems of recruitment and training of scientific and technical personnel for medical radioisotope work in a particular region.

134. The research contract programme on medical applications of radioisotopes will continue to lay emphasis on co-ordinated research. During 1971, a research co-ordination meeting will be held to discuss results obtained under the programme initiated in 1969. A panel meeting will also be held to advise on the development of a new programme to be initiated in 1972.

135. The programme of intercomparison and standardization of medical radioisotope techniques will be continued. As part of the Agency's collaboration with ICSH, a panel meeting will be held during 1971 to discuss the standardization of radioisotope techniques in diagnostic haematology.

136. The role of computers for data analysis in medical applications of radioisotopes becomes increasingly significant. It may be appropriate to hold a symposium during 1971 to review progress in this regard.

137. The fourth Agency symposium on medical radioisotope scintigraphy will be held during 1972.

The programme for 1973-1974

138. During the two-year period 1973-1974, the Agency's programme on applications of radioisotopes in the life sciences is expected to follow similar lines as in the two preceding years. Training activities will include projects planned to satisfy the needs of medical physicists, biochemists and other scientific and technical personnel in developing countries. Further projects for the intercomparison and standardization of medical radioisotope techniques will be developed. In research and in the organization of panel meetings and symposia, increased attention will be given to the applications of radioisotopes in the basic medical sciences, such as biochemistry and microbiology. The close collaboration of WHO will be sought in this work.

Radiation biology

139. A prerequisite to the widespread utilization of the advances in nuclear science and technology is the ability to control the biological hazards of radiation both to workers who are in direct contact with radioactive materials, and to the general population. In order to define acceptable exposure levels or to combat the detrimental effects in radiation accidents the mechanism of radiation injury must be elucidated. Progress in this regard would also facilitate the more effective use of radiation as a tool for medical and industrial applications and for solving fundamental problems in biology and agriculture.

140. The Agency's radiobiology programme reflects a concerted effort to define the fundamental mechanisms of radiation injury and repair and to develop further practical applications of radiobiological knowledge. The activities proposed for 1969-1970 and succeeding years will serve as useful vehicles for providing increased opportunities for participation by developing countries in the programme, foster co-operative efforts within the Agency and with other international organizations, initiate services that an international organization is in a favourable position to provide effectively, and provide balance and continuity between past and present activities.

141. The central theme of research will continue to revolve about the radiosensitivity of biological systems. The scope is being broadened to reflect the continuing evolution and direction of the Agency's overall interests and responsibilities with regard to:

(a) Mechanism of radiation injury and recovery:

  (i) Molecular basis of the radiation damage and repair;

  (ii) Cellular level (haematological, immunological, germinal system);

  (iii) Modification of radiation injury; and

(b) Radiobiological applications:

  (i) Radiosterilization of biomedical products;

  (ii) Immune applications (vaccine and toxoid preparation);

  (iii) Induced mutation of micro-organisms (including industrial uses).

142. The International-Chromosome Analysis Newsletter (I-CAN) will continue to be published and distributed in co-operation with the New England Medical Center Hospital, Boston, Massachusetts. Its aim is to foster co-operation and progress in the field of automated karyotype analyses, a method which, when perfected, will contribute considerably to evaluating chromosome injury to humans due to irradiation and other biomedical aspects of health and disease.

The programme for 1969-1970

143. Specific activities proposed for 1969 are discussed below.

144. The most important consequence of human radiation over-exposure is the increased frequency of cancer and mutation, yet the relationship between these two major effects is not clear. However, dramatic advances in molecular biology, such as the translation of the genetic code and the elucidation of mechanisms for regulating cell proliferation, differentiation and function, suggest that a meeting of molecular biologists, geneticists, virologists, radiobiologists and cancer cell investigators would provide a unique forum for the exchange of information on this enigma. A symposium on radiation-induced cancer and mutation will therefore be held in 1969, in which the co-operation of WHO will be solicited.

145. Accidents in connection with reactor criticality or waste disposal could lead to widespread dispersion of radionuclides in the environment and result in the contamination of large groups of the population. Internal contamination would constitute the greatest hazard, particularly to those under 35 years of age; children in utero would be most vulnerable to developmental anomalies. A meeting of consultants to clarify the knowledge of toxicity in radionuclides, the dynamics of their deposition, turnover and excretion, and their cellular and intracellular effects would be timely, as the exploitation of nuclear energy is expanding so greatly and the use of radioisotopes for biomedical applications in humans is widening.

146. The ability of the Agency to promote progress in relevant areas of the nuclear science programme of many of the newly developing countries depends on how clearly the most urgent needs can be identified and on the interests and resources of the country or region in question. An effective approach would be to organize a regional information or consultation meeting on the role of radiobiology in the life science programme of emerging nations in 1969 to discuss these objectives and lay the groundwork for developing appropriate future activities based on research proposals, meetings and various technical assistance projects. Participants would represent the educational, research and administrative levels of the life science communities in the region, complemented by selected Agency staff, other international organizations serving the region and independent scientific experts.

147. Biological tissues are notoriously difficult to sterilize by conventional techniques and the methods used often involve a compromise between the degree of sterility that can be attained and the minimum damage to the tissues that can be tolerated. The unique properties of ionizing radiations, such as penetration and the ability to sterilize with a negligible rise in temperature, have prompted many workers to consider the possibility of using radiation sterilization. It is therefore proposed to hold a panel in 1969 to be entitled "The Radiation Sterilization of Biological Tissues, Cartilage, Bone and Vessels".

148. Mortality and disability due to snake bite and other animal poisons are significant factors in many areas of the world among both the humans and livestock. Recent reports of the use of radiation to inactivate the toxic factors of snake venoms while retaining most of the original antigenic character suggest that this may be a feasible approach to producing safe and effective vaccines for a variety of animal poisons. A panel of experts on radiation sensitivity of toxins and animal poisons, from different geographical locations, would help to crystallize the most critical objectives and approaches, co-ordinate efforts, settle on standardized assays, and catalyze interest and support in other countries. A panel meeting on the radiation sensitivity of toxins and animal poisons is therefore proposed.

149. In the past decade, much information has accumulated on the frequency, correlation and methodology of detecting various types of chromosome aberrations in humans exposed to multiple environmental hazards and on disease patterns including radiation exposure, leukaemia, metabolic disorder, drug toxicity, etc. Characterization and quantitation of the normal and induced incidences among populations of different races, geographical areas, cultures, etc. must be defined if chromosome analysis is to serve as a sensitive and reliable indicator of low-level and chronic exposure of both occupational workers and the general public. It could also serve as an important index for assessing synergistic effects of

irradiation, such as virus infection, air pollution, drug toxicity. Since this subject is also of interest to WHO, it is proposed to invite its co-sponsorship of a panel on radiation population genetics.

150. The preparation of a manual on radiation haematology has been repeatedly suggested by consultants and members of recent panels and symposia, because no similar handbook is now available for the physicians in the medical service of atomic industry establishments. The preparation of this manual will begin in 1969. It will include, besides the latest theoretical findings, methodological recommendations and practical advice for observing and checking the blood-forming and immunological functions of workers in nuclear industry and of patients receiving radiation therapy.

151. Little attention has been paid until now to the teaching of the fundamentals of radiation damage in schools of medicine in almost all countries. It is proposed to prepare a manual of pathophysiology of radiation damage providing basic knowledge on the effect of radiation and isotopes, on the pathophysiological changes in irradiated animals, including man, and on the possibilities and hazards of the use of radiation and isotopes in experimental and clinical medicine. The manual would be destined for the students in schools of medicine and physicians in medical post-graduate courses, particularly in developing countries.

152. It is hoped to organize in 1969 a training course on the applications of radiation for sterilizing biomedical products. Participants from Member States which have an interest in exploiting such applications would be invited to attend for 6-8 weeks, and the course would deal with the methods, concepts, practices, standards, and criteria of producing and ensuring radiation-induced sterility of various biomedical products, the range and diversity of which would provide ample vehicles for explaining the major radiobiological principles and techniques. The course would be held in one of the more advanced countries actively engaged in this field. The preparation of a suitable manual would be desirable.

153. The activities proposed for 1970 are discussed below.

154. Irradiation is known to be a useful tool in the production of beneficial mutants in various micro-organisms, plants and other organisms. One of the most important activities in the chemical, pharmaceutical and food industries is the production of many organic raw products, reagents, drugs, antibiotics and foodstuffs biosynthetically, i.e. by microbiological fermentation. Microbiological methods also seem to be most promising for opening up new ways of making proteins. There is a real possibility of producing new beneficial mutants of microbes by means of irradiation, which could not only increase the efficiency of already known fermentation processes for the production of drugs, antibiotics, etc. but also widen the spectrum of fermentable sources and products such as new antibiotics, drugs and nutritional proteins. In collaboration with UNIDO a symposium may be organized to sum up present methodological experiences and results regarding the use of radiation in the genetics of industrial micro-organisms and to discuss future possibilities, opportunities and trends.

155. It has long been the hope of radiobiologists to discover a simple, accurate, rapid biological indicator of radiation exposure in the case of the mammalian organism. It would be useful not only to assess the degree of exposure and, consequently, the type of treatment required for radiation accident victims, but also to obtain an index of radiation tolerance for patients receiving large therapeutic doses of radiation. Often it is the hesitation to overextend the treatment in cancer patients - particularly patients receiving whole-body exposures as in leukaemia and kidney transplantation - that limits the success of the therapy. Due to the lack of success 5-10 years ago, interest in this objective has waned. However, with developments in chemical techniques and deeper insight into the modes of pathophysiology, it is time to reassess the situation and catalyze progress towards this end. A panel on biochemical indicators of radiation injury will therefore be convened, in which the Agency's Division of Health, Safety and Waste Disposal and WHO would be expected to collaborate.

156. New techniques are being developed which can fractionate a cell into its various organelles, particles and molecular species. Recent biochemical research suggests that desoxyribonucleic acid may also be present in the cell cytoplasm, particularly in the mitochondria. This has enormous implications for the critical site of cellular radiosentivity, the role of cytoplasm controlling gene activity, repair mechanisms of radiation lesions, etc. A panel on the effect of radiation on subcellular particles, bringing together the various disciplines and orientations, to integrate relevant data and to promote further progress and insight into both cell function and the base for radiation sensitivity will be organized.

157. Despite the key role that enzymes play in controlling cellular metabolism, it is still not clear whether enzyme damage per se is an important factor in radiation injury. However, as more is learned of the structure and function of enzymes as catalysts, it is becoming evident that differential radiosensitivities in their allosteric and catalytic sites can occur, which suggests new concepts for explaining the radiation injury, the mechanism of action of radioprotective agents and possibly even the bases for developmental anomalies during extended exposures. By 1970, the time will be ripe to explore the status and significance of the mode of enzyme inactivation by irradiation. Extension of these concepts would have practical applications for the biomedical product radiosterilization programme as well as the food pasteurization programme. A panel on the effect of ionizing radiation on enzymes will therefore be held in 1970.

158. Most of the prevailing concepts regarding the fundamental molecular lesions induced by radiation are based on microbial systems, and the indications are that the capacity to repair injury may be the critical factor in determining radiosensitivity. It is proposed to convene a study group on the relationship of microbial injury and repair mechanisms to mammalian systems to explore how far microbial data and concepts can be extended to mammalian cell systems in the light of their qualitative differences and what critical experiments are needed to provide a basis for extrapolation.

159. If funds can be made available, a training course on mammalian cytogenetics will be supported by the Agency. It will serve to increase the number of persons trained in the use of cytological methods of measuring radiation damage in man and their applications to various medical problems and would be particularly valuable to personnel responsible for health and safety in nuclear industry.

160. A study tour of Member States which are actively engaged in studying and applying radiation for the sterilization of biomedical products may be organized. Representatives from the relevant industries and research centres in such States will be invited to participate, in order to exchange experiences, develop contacts and gain familiarity with new areas of potential interest.

The programme for 1971-1972

161. For the two-year period 1971-1972 one of the activities planned is the preparation of a laboratory training manual on radiation biology, which would provide a useful and necessary tool for future Agency-sponsored radiobiology courses and for institutions in developing countries - and even in many advanced countries - desiring to organize their own courses, as well as for individual life science investigators who wish to extend their interest and activities to radiobiological applications. Co-operation with UNESCO would be desirable.

162. It is also tentatively planned to organize during 1971-1972 at least two symposia on:

(a) The effect of radiation on the sensory organs (1971); and

(b) Mammalian radiation genetics (1972).

The programme for 1973-1974

163. In general, it is expected that the work on radiation biology will follow the pattern of preceding years through 1973-1974; it is contemplated that symposia may be arranged on:

(a) Biological effect of heavy particle irradiation (1973); and

(b) The effect of radiation on the neuro-endocrine system (1974).

164. Panels may be convened as necessary, probably on:

(a) The use of carbon dating in biology; and

(b) The abscopal effect of irradiation.

165. If funds are available, training courses will be organized in radiation genetics and the use of bone marrow for transplantation.

Dosimetry

166. During 1967 the Dosimetry Section was set up in the Division of Life Sciences, and to it were assigned the problems of radiological physics and radiation dose measurement in the life sciences. The Section will concern itself with projects which fall into one or more of the following categories:

(a) Direct or indirect assistance to Member States, especially to the developing countries;

(b) Such contributions to dosimetry in its advanced forms as can best be made under international auspices; and

(c) Co-operation and consultation with other units of the Agency and WHO, as well as with other international organizations and national standards laboratories.

167. Among the many projects which fall within these categories, it is proposed to give priority to those which do not otherwise receive adequate attention. The programme as a whole, however, and the main activities which will engage the Agency's attention throughout the period 1969-1974 are broadly described in paragraphs 168 to 174 below; specific projects now planned for any given year or two-year period are dealt with later.

168. The dissemination of information is one of the basic responsibilities of the Agency. The rapid increase in technical publications in many languages makes it increasingly difficult for scientists to have on hand all the latest pertinent data. The Agency is in a particularly good position to collect information on a world-wide basis, analyse and evaluate it, and make it widely available, a service which is of greatest help to less-experienced scientists in developing countries. Some of the dosimetry information services which are now contemplated are as follows:

(a) Maintenance of current files on:

(i) Users of and equipment for high-energy radiation therapy;

(ii) Commercially available instruments for dose measurement; and

(iii) Available fellowships and courses of training and graduate study;

(b) Collection and distribution of physical data and annotated bibliographies for medical and biological radiation dosimetry; this information will be stored on punched cards for easy up-dating and frequent print-out and distribution (it is hoped this can be done in close co-operation with the INIS programme);

(c) Maintenance of the "Radiation Data for Medical Use" scheme; obsolete material will be dropped and new material added, as appropriate. This collection will be dealt with as described in item (b) above, and will thus serve as a catalogue;

(d) Production of manuals, with the help of consultants, on:

(i) Recommended dosimetry methods for small radiotherapy centres, which will attempt to establish an acceptable minimum set of procedures for the dosimetry of radiotherapy and will cover all steps from the initial calibration of the dosimeter to the final specification of dose in the patient; and

(ii) Routine techniques for recommended dosimetry systems such as, for example, the Fricke ferrous sulphate chemical system and the lithium fluoride thermoluminescent system. Such manuals would aim to give in full detail procedures which will give a high probability of reliable results for any careful practitioner.

169. By means of a postal intercomparison service the Agency will make available to any institution in the world an intercomparison for reliable absorbed-dose measurements. Preliminary intercomparisons carried out in 1966 and 1967 demonstrated both the need for and the reliability of the proposed postal method. Institutions approached for the initial test intercomparisons were eager to participate. The many requests for this service make it clear that this is an appropriate time to extend to absorbed-dose measurements the postal calibration service which has been successfully carried out for radioactivity sources by the Seibersdorf Laboratory.

170. The calorimeter is generally accepted as the absolute standard for absorbed-dose measurement, though few if any truly portable calorimeters exist outside the Agency. Its two portable quasi-adiabatic beam calorimeters are highly suitable for direct intercomparisons with calorimeters now undergoing design and construction at most of the national standardizing laboratories. Such comparison will aid the development of the precise instruments which will furnish the basic dose standards in the coming years. The Agency's portable calorimeters can also be taken to various radiation beams to determine calibration factors and the energy-dependent parameters which must be known for universal use of secondary standard methods.

171. Research has in the past not played a large role in the radiological physics and dosimetry programme of the Agency owing to the shortage of trained personnel in the developing countries and the nature of the activities which such personnel must carry out. There should, however, always be the possibility of some research contracts in dosimetry.

172. Short-term technical assistance assignments and advisory services will be undertaken by Professional officers in close co-operation with the Division of Health, Safety and Waste Disposal and the Department of Technical Assistance. In order to meet the technical assistance responsibilities of the Agency efficiently, members of the Dosimetry Section are designated as responsible scientific officers for relevant technical assistance projects and work closely with the area officer and field experts.

173. Some of the panels and international meetings which are to be organized will be directly related to the continuing programme in the foregoing categories; some will simply be on subjects where it seems important and useful to encourage exchange of information, to provide a meeting-ground for colleagues from many countries, to encourage common activities such as co-ordinated research programmes, and to inform and instruct participants from the developing countries. These meetings frequently result in important Agency publications.

174. Consultants' services will be required from time to time to advise on various aspects of the programme.

The programme for 1969-1970

175. Specific proposals for 1969 are as follows:

(a) It is proposed to hold a panel meeting on absolute dose determination as a recommended follow-up of the panel of October 1967 on medical radiation dosimetry and also of the 1964 consultants' meeting on absolute dose determination; absorbed-dose calorimetry is likely to be in an advanced stage of development and testing in most of the national standards laboratories at that time, making it an appropriate time for such a meeting; and

(b) The University of Chicago and the USAEC are planning an international symposium on radiation accidents in 1969. It is proposed that the Agency sponsor this meeting jointly with the University of Chicago. It is planned to cover such subjects as radium accidents, leaking cobalt-60 sources, design of radioisotope laboratories to reduce hazards, etc. This would be a useful meeting for the health physicists of the smaller countries. The co-operation of UNIDO will be invited.

176. Activities which will extend over both 1969 and 1970 are discussed below:

(a) It is proposed to study the possibility of encouraging existing national dosimetry facilities to extend assistance to other countries in the region. One or more study groups might have to be convened in an area before suitable arrangements could be made for such regional services;

(b) It is estimated that 75 to 100 institutions will take part in the postal intercomparison. The portable calorimeter should be used in an extended intercomparison programme. It is expected that there will be many requests from Member States for this service; and

(c) A research contract programme is proposed, which would cover the following five topics: development of new dosimetric techniques, investigation of existing dosimetric systems for special applications, dosimetry of radioactive pharmaceuticals, determination of chemical G values, and studies of physical factors influencing biological effectiveness.

177. It is proposed to hold in 1970:

(a) A panel meeting on advances in physical aspects of radiation therapy, which would be a follow-up of the 1965 and 1967 panels on computers in radiation therapy; in addition to recent computer work, the panel will consider such subjects as treatment simulation, treatment automation, etc.;

(b) In co-operation with the Division of Health, Safety and Waste Disposal, meetings of groups of consultants on radiation dosimetry of high-altitude and space travel to collect and evaluate the available information so as to provide a sound basis for judgement by the Member States as to the health aspects of such travel (see paragraph 460(a) below);

(c) A symposium on the dosimetry of external-beam therapy. This would be the first large international meeting on this subject, which has been chosen as narrow enough to attract a homogeneous audience, but broad enough to attract participants from both advanced and developing countries; and

(d) A symposium on biophysical aspects of radiation quality, a recommended follow-up on the 1965 and 1967 panels on that subject. Work in this important subject is rapidly expanding, and by 1969-1970 the symposium would be amply justified.

The programme for 1971-1974

178. During the succeeding period, from 1971 to 1974, the postal and calorimetric intercomparison services are expected to play an increasingly important role, since it is expected that requests from Member States for assistance from the dosimetry laboratory will increase steadily. A small increase in laboratory staff and facilities may be necessary to meet the needs which will arise.

179. Since the Laboratory will in any event not be able to fulfil all the dosimetry requirements of those Member States without standard laboratories, the establishment of regional dosimetry centres should be encouraged.

180. The increasing use of research reactors in all countries, large and small, can be expected to result in increasing activity in the radiobiology of fast neutrons. It is expected that this will result in an increasing need for convenient and accurate dosimetry in mixed radiation fields, and it is likely that this will be a direction in which the Agency's work will turn during the period 1971-1974.

Explanation of cost changes (1968/1969)

181. As shown in Table 11, the cost of the life sciences programme in 1969, including nuclear medicine, radiation biology and dosimetry, is expected to increase by approximately 2.71% over the level of the approved budget for 1968. The increases set out below and the increase of $2500 for "Seminars, symposia and conferences" are partially offset by the reductions proposed in respect of other items.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$219 000	$237 800	$18 800 = 8.58%
Common staff costs	$ 78 000	$ 84 400	$ 6 400 = 8.21%

182. The 1969 budget estimate provides for two new P-1 posts which, together with salary increases for GS and M&O staff in 1968 and a post adjustment for Professional staff approved in 1968 account for the increases shown above.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$300 500	$291 500	($9000) = (3%)

183. The decrease of $9000 in the 1969 budget for all other items represents a reduction of $5500 under "Panels and committees", with one panel less than in 1968, a reduction of $4000 for research contracts, which is the main item of expenditure under "Scientific and technical services", and a reduction of $2000 for "Duty travel and missions", partially offset by an increase of $2500 for symposia which will permit three symposia to be held in 1969. No change is expected in the estimate for "Representation and hospitality".

4. PHYSICAL SCIENCES

Summary of costs

Table 12

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	284 339	290 500	48 800	339 300	37 500	376 800
Common staff costs	101 465	103 000	17 400	120 400	13 000	133 400
Panels and committees	29 935	31 000	7 500	38 500	(3 000)	35 500
Seminars, symposia and conferences	24 913	50 000	(11 500)	38 500	(5 500)	33 000
Scientific and technical services	90 475	105 000	(2 000)	103 000	5 000	108 000
Duty travel and missions	24 183	35 000	(8 000)	27 000	4 000	31 000
Representation and hospitality	1 500	1 500	-	1 500	-	1 500
TOTAL	556 810	616 000	52 200 8.47%	668 200	51 000 7.63%	719 200

Programme

Highlights

184. The physical sciences programme covers the work of the Division of Research and Laboratories on the utilization of radioisotopes and radiation sources in physics, chemistry hydrology and industry. This Division is responsible for keeping abreast of new developments in these subjects and for rendering assistance or giving advice to Member States by means of expert visits, study tours, panels, symposia, dissemination of information, advisory service missions, research contracts, regional projects, and nuclear data exchange.

185. The estimated increase in costs in 1969 over the approved budget for 1968 is attributable to increased emoluments for GS and M&O staff, a post adjustment for Professional staff applied in 1968, the upgrading of one P-4 post to the P-5 level for a senior groundwater hydrologist, and the provision of one P-4, two P-3 and one GS post in the Nuclear Data Processing Unit in connection with the nuclear data exchange system based on INDC's recommendations. These costs are partially offset by reductions in costs in respect of scientific meetings, research contracts, and "Duty travel and missions".

186. The preliminary estimate for 1970 assumes further increases of one P-5 post in connection with the industrial application of radioisotopes, one P-4 post for a hydrologist and two GS posts for supporting services. Minor cost increases for travel and research contracts are offset by declines in the cost of expected meetings. The detailed programmes for each of the four major functional areas are outlined below.

Physics

187. Current progress in nuclear technology continues to depend on co-ordinated research. In the developing countries, physics research work contributes to the establishment of a basis for the more exclusive applications of technology. This is reflected in the Agency's programme, which places emphasis on research problems of importance in current or future nuclear energy applications.

188. The long-range objectives include continued emphasis on fission and fusion research; it is appropriate for the Agency to provide world leadership in information exchange on both of these topics. Further activities of continuing interest are neutron experimentation - especially the study of neutron interactions and scattering, the investigation of solids by neutron diffraction, and the use of neutron generators - and the provision of assistance in the utilization of experimental facilities (low-energy accelerators and research reactors) for physics research in developing countries. Finally, a modest programme of information exchange and research support should serve to maintain contact with developments in the fields of nuclear forces, nuclear structure, condensed matter physics, plasma physics, and space physics.

The programme for 1969-1970

189. Activities proposed for 1969 are discussed below:

(a) A symposium on the physics and chemistry of fission, with emphasis on the detailed study of the fission process and its products, will be convened in 1969 to deal with the wealth of new experimental results accumulated since the previous Agency meeting in 1965. Developments in experimental techniques (on-line mass separators, solid-state detectors, time-of-flight measurements) and highly advanced systems of data acquisition (coincidence methods, multiparameter analysers) have yielded more precise and complete data on mass, charge, and energy distributions of fission fragments, angular correlations, delayed neutrons and their precursors, etc.;

(b) A symposium on radiation damage in solids and reactor materials will be held in 1969 covering the fundamental atomic displacement and annealing processes, correlations of exposure and damage, and other physical and chemical phenomena involved in radiation damage; since the previous Agency symposium in 1962 significant improvements have been made in experimental techniques for studying radiation damage;

(c) Neutron generators are relatively inexpensive and can be used for a variety of experimentation, such as reactor physics, nuclear physics, solid state physics, and activation analysis; they are especially suited to the needs of smaller institutes and a number of developing countries are already engaged in this work. The Agency will accordingly convene a panel in 1969 to explore all aspects of the utilization of neutron generators in physics and chemistry; and

(d) The Agency will explore the possibility of initiating or supporting regional projects aimed at establishing sophisticated research facilities in physics, for example, an intense neutron source, to serve small as well as advanced nations.

190. Activities proposed for 1970 are discussed below:

(a) The need for a panel on thermal neutron radiative capture is becoming increasingly evident and the holding of a meeting in 1970 is highly desirable. With the extensive use of lithium-drifted germanium detectors and high-resolution bent crystal spectrometers, low-energy capture gamma rays

can be measured with greater precision, yielding new data on decay schemes, spin-assignments, capture mechanisms, characteristics of low-lying states, and other important aspects of nuclear structure;

(b) A study group on the utilization of low-energy accelerators was convened in 1967 primarily to benefit developing countries in Eastern Europe and the Mediterranean region; in view of the interest expressed by the participants, another meeting of this type will be convened in 1970;

(c) A symposium on the use of pulsed techniques and intense neutron sources for research in physics is planned for 1970; this will cover the developments since the Agency's symposium on pulsed neutron research in 1965, reflect the rapidly growing interest in intense sources of neutrons, and permit problems in reactor physics - especially those related to fast reactors - and a host of other problems related to the interaction of neutrons with matter to be investigated more effectively; and

(d) To enable the Agency to be informed on important developments, or to stimulate specific areas of research related to nuclear technology, meetings on one or more of the following subjects are proposed for 1970:

(i) Nuclear forces and nuclear interactions;

(ii) Direct conversion; and

(iii) Nuclear techniques in condensed matter physics.

191. If continuation of the proposed regional project study referred to in paragraph 189(d) above results in firm plans for one or more regional research facilities, the advice of consultants will be needed in 1970.

The programme for 1971-1972

192. As far as the planning of activities for 1971-1972 is concerned, the Agency expects to hold about two or three meetings per year, with emphasis on neutron physics, fusion and fission, and the utilization of research facilities in developing countries. The next conference on controlled nuclear fusion research should be convened in 1971. In view of the new interest in high-current proton accelerators in the range of 500 to 1000 MeV, it may be useful to convene a symposium on nuclear forces, with emphasis on intermediate energies and pion interactions. During 1971-1972 an effort should be made to implement plans dating from 1969-1970 for sophisticated regional research facilities to benefit small countries.

The programme for 1973-1974

193. During the two-year period 1973-1974, a general continuation of the programme indicated above is envisaged. Exciting developments may be expected in medium- and high-energy nuclear physics and in the increased use of nuclear energy in space research steady progress will be made towards solving the problem of controlled fusion, theoretical advances will be made in the theory of fission and nuclear structure, and there will be a better understanding of nuclear matter through advances in heavy-ion accelerator physics, etc. All of these developments, and perhaps some unpredictable developments, will be of interest to the Agency in the next five years.

Nuclear data

194. The objectives of the Agency's nuclear data programme are, of necessity, long-range in character; they combine the securing and exchange of basic neutron information of value in the design and operation of nuclear reactors. In pursuit of these objectives, the Agency both assists and is assisted by INDC, which is a continuing committee and itself an important

information exchange medium that advises the Director General from time to time. The Agency's Nuclear Data Unit provides the secretariat for INDC.

195. Continuing activities are designed:

(a) To ensure the complete collection and exchange of the world's basic neutron data;

(b) To make possible higher precision in the measurement of cross-sections, wherever this is required, through the development of better techniques and the obtaining of more precise values of the few basic cross-sections relative to which all other cross-sections are measured; and

(c) To stimulate basic neutron measurements by convening those international panels, symposia and conferences which are most needed.

The programme for 1969-1970

196. In the years 1969 and 1970 it is intended to complete the development phase of an international system for compiling and exchanging the world's basic neutron data. It may well be that, subsequent to this, the regular work of the Nuclear Data Unit in data compilation and exchange will become increasingly one of co-ordinating the established, world-wide activities of the regional data centres, with INDC playing an important role. To achieve these objectives, consultations and consultants' groups will be required.

197. It is planned to hold regularly every three or four years an international conference on nuclear data for reactors. The first such conference was held in Paris in 1966 and the second is scheduled for 1970. To meet the need for reviewing specialized topics, such as statistics of resonance parameters or radioactive capture of fast neutrons, there will be one panel meeting each year in which there is no conference.

The programme for 1971-1974

198. By 1971-1974 the Agency should be carrying out some kind of work relating to nuclear standards; it should, for example, be in a position to sense the need for and subsequently to promote the measurement of cross-section values with the highest possible precision by means of an international programme, which may ultimately rely upon exchanges of persons, teams and materials between laboratories engaged in such measurements.

Chemistry

199. The programme will continue to cover both fundamental and applied chemistry. Reflecting the need of Member States, emphasis will be placed on:

(a) The critical evaluation of chemical data;

(b) Promotion of efficient uses of irradiating machines;

(c) Advisory services to developing countries; and

(d) Joint projects aimed at solving common problems.

The programme for 1969-1970

200. Activities proposed for 1969 are:

(a) A panel on radiation chemistry to assess the present state and future trends of an activity which is included in every programme of developed and developing countries, and for which research reactors are commonly used; or

(b) A panel on neutron activation analysis. This technique is now widely used in many disciplines. One aspect which is receiving considerable attention is the use of nuclear techniques in crime detection, where samples are often very small and a non-destructuve technique has great advantages. This panel will determine whether the Agency has any role to play in co-ordinating the work done and particularly in stimulating the collection of data from various parts of the world, since such techniques could perhaps become much more effective if data were available on a wide scale; or

(c) A panel on analytical chemistry of nuclear materials. In view of the growing importance of precise quality control of nuclear materials, there has been an increasing need to review developments in analytical methods and to provide laboratories in Member States with guidance on standardized methods of quality control. Activities in analytical chemistry will be conducted in conjunction with laboratory work, and emphasis will be placed on nuclear fuel materials; and

(d) A regional study group on isotope production in Latin America; as a number of countries undertake isotope production, there is a growing need to exchange views on an international or regional level on production processes, dispensing, quality control and assay, and also hot laboratory facilities.

201. Activities proposed for 1970 are:

(a) A panel on radiochemistry in nuclear phenomena. Radiochemical research and the use of radiochemical techniques which play an important role in nuclear energy programmes have been steadily increasing. There has been a serious need for the exchange of information, a crucial evaluation of particular fields and techniques of radiochemistry, and advisory services to Member States. Emphasis in the long-range programme will be placed on hot atom chemistry, chemistry of fission, plutonium and trans-plutonium elements chemistry, the promotion of reactor- and accelerator-based chemical research, and experimental techniques involving fast radiochemical separation and on-site measurements;

(b) A symposium and concluding panel on the thermodynamics of nuclear materials. The Agency has organized several symposia and panels on the critical assessment of data on nuclear materials, among which the thermodynamic properties are considered as guiding properties in nuclear technology. The symposia, held at intervals of 2-3 years, and the panels, held at intervals of 1-2 years, are attempting to present users with a set of the most reliable data for nuclear science and technology;

(c) A seminar on accelerator-produced isotopes. There has been an increase in these isotopes, but information is limited. There are a number of technical aspects which need discussion on an international level, such as target techniques, chemical processing, and assay;

(d) A regional study group on isotope production in countries in Asia, similar to the one for Latin American countries referred to in paragraph 200(d) above; and

(e) A symposium on nuclear activation techiques. The symposium on nuclear activation techniques in the life sciences held in 1967 showed that this is a vigorous and rapidly developing field; to maintain and focus this interest, a second symposium is proposed for 1970.

The programme for 1971-1974

202. During the period 1971-1974 it is foreseen that it may be necessary to plan panels, symposia, meetings and regional study groups on the following subjects:

(a) Production of isotopes;

(b) Preparation and analysis of labelled molecules;

(c) Analytical chemistry of nuclear materials;

(d) Thermodynamics of nuclear materials;

(e) Activation analysis;

(f) Radiation chemistry; and

(g) Nuclear chemistry and radiochemistry.

203. The detailed organization of the programme will depend on developments. In addition, advisory services to Member States and training programmes will be provided, as necessary.

Hydrology

204. Isotope techniques are now applied in water resources investigations in some 30 countries. Potential applications in developing countries are numerous, but lack of knowledge and of qualified personnel and equipment is a major drawback to their maximum utilization by the hydrologist. Isotope techniques complement and supplement conventional hydrological techniques, in many cases offer savings in time and cost and in some cases can provide unique information obtainable in no other way. The Agency's programme is oriented to the development of these techniques and to the transfer of knowledge and skill to those areas of the world where water problems are most urgent.

205. In the early development period the main emphasis was on the use of artificial radioisotope tracers, but in recent years the emphasis has shifted to the use of environmental isotopes to study broader aspects of the hydrological environment. A number of techniques involving the use of artificial radioisotope tracers is now available, but the size of the area which can be studied is limited by considerations of economy and health and safety. The environmental isotope approach involves the use of isotopes already present and enables studies of much larger areas, which is of particular interest in places where basic hydrological data are lacking.

206. There is, however, a lack of facilities for the analysis of environmental isotopes in natural water samples. In the immediate future the situation can be alleviated by an expansion of the Agency's analytical capability and the encouragement of national laboratories to collaborate in studies where no analytical facilities exist. A longer-term solution requires the establishment of new laboratories for the use of isotopes in hydrology which the Agency would serve in an advisory capacity and which would furnish analytical and interpretation services for a geographical area. It is proposed that the possibility of establishing such laboratories, at no cost to the Agency, say in Latin America or South East Asia, should be examined during the two-year period 1969-1970. Further developments would show whether the establishment of additional regional laboratories would be desirable.

207. The major part of the Agency's activities in isotope hydrology contributes to the programme of the IHD. The programme period now under consideration forms the last part of the decade which ends in 1974, and it is hoped that by that time isotope techniques will have become an established tool of the hydrologist. The IHD is no doubt accelerating this process by providing means of collaboration between the hydrologist and the isotope worker.

208. The Agency will continue assisting with isotope studies in the investigation of representative and experimental basins similar to the studies carried out in the Vienna Basin and the Modry Dul Basin in Czechoslovakia. The former is a groundwater study, while the latter is one of snow hydrology. Future studies are expected to consist of surface water, including limnological, investigations, and water balance studies.

209. The Agency will continue to contribute to the IHD programme, particularly through the collection of world-wide environmental isotope data, and work relating to inventories, water balance and research.

210. A most important activity is the world-wide precipitation and river water sampling network which was established in co-operation with WMO and UNESCO. The network at present covers all continents and oceans, with some exceptions, in Europe and Asia. It is hoped that the gaps will be filled during the coming years.

211. The training aspects of the IHD programme will include provision of lecturers on isotope techniques in hydrological training courses, in addition to specialized training courses dealing only with the use of isotope techniques in hydrology.

212. The Agency provides the technical secretariat for the IHD Working Group on the Use of Nuclear Techniques in the Unsaturated and Saturated Zones. The group is expected to meet each year until the end of the IHD in 1974. In addition the Agency is represented on other IHD Working Groups, such as that on Representative and Experimental Basins.

213. Lack of information on the use of isotope techniques in hydrology is undoubtedly holding up the more widespread use of these techniques. Information on the use of such techniques is available from the Agency, which is operating an advisory and information service. Advice is given on the feasibility of applying isotope techniques to a particular hydrological problem. As the potential of these techniques is realized, there will be increased demands for this service. Within the limitations of the Agency's laboratory facilities, it is foreseen that short-term investigations could be implemented by the Agency. Besides solving the problem in question, such small projects would be very useful for the purpose of demonstration, for which there is a pressing need.

214. On-the-spot advice can be provided by regional advisers, located for extended periods in a given region, and by Agency staff. The requests for visits of special missions are relatively few at present, mainly because the potential user is the hydrologist who is not in communication with the Agency. On the other hand, the contacts established through the IHD and during visits of Agency staff to field projects where subcontractual work is being carried out are resulting in requests for advice and assistance.

215. The organization of symposia on the use of isotope techniques in hydrology will continue to provide a useful means of exchange of information. At present it is proposed to hold one on this subject in early 1970 and one in 1973.

216. By 1969 it is expected that a number of field studies on the use of isotope techniques in hydrology will have been completed and that periodic panels would be convened to evaluate the results and provide needed guidance for the improvement of their practical application. Consideration will also be given to the organization of working groups to discuss specialized problems of isotope application.

217. The Agency will encourage and support the development and use of nuclear geophysical instruments for determining the hydrological and geological parameters of aquifers in routine hydrological investigations. Although nuclear geophysical instruments and techniques now exist which are ready for use and very suitable for routine hydrological investigations, these techniques are not yet well known and the Agency can serve a very useful function by publicising them and co-ordinating further research.

218. The role of the Agency as a sub-contractor to the United Nations, FAO and UNESCO in providing isotope services in hydrology is increasing and is expected to grow further. This will require an increased effort in the planning and interpretation not only of the investigations mentioned, but also of those not carried out under UNDP/SF projects.

219. As more isotope hydrological laboratories come into operation in developed countries, the Agency's role in co-ordinating the efforts of these centres with the need for analytical services in developing countries is expected to increase. This may take the form of "sister laboratory" agreements or special analytical services provided voluntarily by Member States.

220. The collection of data on the occurrence of deuterium, oxygen-18 and tritium in natural waters will continue. The Agency acts as a compilation centre and is using its computer facilities to provide basic isotope data together with the hydrometeorological data required for interpretation of general and specific investigations.

221. Computer storage of the six-year back-log of isotope and hydrometeorological data will be completed early in 1968. It will be followed by programming and processing of the data, including maintenance of the hydrological file, publication of yearly reports, selective plotting, statistical analyses such as correlation studies, and calculations for and analyses of specific hydrological investigations.

222. The most important unknown factor at present in computing the water balance for areas with open water bodies, an essential task of water utilization planning, is the isotopic content of atmospheric moisture. The resultant problem, long recognized by the Agency, was recently expounded publicly at the Colloquium on Isotopes in Hydrology, held in Heidelberg in September 1967. The Agency could and should perform the useful function of initiating and co-ordinating an isotopes-in-atmospheric-moisture network.

223. At this stage it is difficult to see precisely how future developments in the use of isotope techniques in hydrology will affect the Agency's programme. This will to a large extent depend on the establishment of regional isotope hydrological laboratories. If these are not established or are not available in sufficient number, provision for analytical facilities must be made, possibly by an appreciable expansion of the Agency's own facilities.

Industry

224. The Agency's work relating to the industrial applications of radioisotopes will continue to cover four broad areas of activity:

(a) Analysis, testing and control;

(b) Industrial radiation processing;

(c) Tracers; and

(d) Radioisotope-powered energy sources.

225. Radioisotope techniques are now being used more frequently to solve environmental pollution problems, nuclear techniques promise to contribute significantly to the exploration and exploitation of natural resources, and many radiation processes are expected to be used on a commercial scale, representing technological and economic break-throughs. These will receive particular attention because of their special interest to developing countries, whereas other activities, such as industrial instrumental control, the use of tracers for plant optimization and the terrestrial applications of radioisotope power generators will be carried out on about the same scale as previously.

226. The planning of the programme through 1974 is based on the following facts, assumptions and projections:

(a) The increase in requests for technical assistance is expected to continue;

(b) Many Member States are developing industrially to the stage where radioisotope techniques can make a significant technical and economic contribution;

(c) A new nuclear technology has evolved which will enable developing countries to exploit their natural resources most effectively;

(d) Some industries are common to most developing countries and it is on these that efforts will be concentrated; and

(e) The need to adapt radioisotope techniques to the particular circumstances in developing countries will require continued effort in research and co-ordination.

The programme for 1969-1970

227. For 1969, a symposium on the utilization of large radiation sources and accelerators in industrial processing to cover the rapid development in this technology, a panel on industrial applications of radioisotopes in developing countries and a study group on radioisotopes in the oil industry are proposed; a consultants' meeting to advise on the preparation and distribution of mineral standards for radioisotope X-ray fluorescence is also planned. The regional training course on industrial applications of radioisotopes held in 1966 was so successful that, subject to the availability of funds, it is proposed to repeat it in another region. A study tour on industrial applications of radioisotopes and radiation is planned for North America, subject to the availability of funds.

228. For 1970, a symposium on nuclear techniques in civil engineering and environmental control, two panels on radioisotope applications in metallurgy and large radiation source applications, a study group on the potential utilization of radioisotopes in developing countries, and consultants' meetings on co-ordinated research programmes in developing countries and the preparation of a guide-book on tracer techniques in plant studies are proposed.

The programme for 1971-1974

229. During the two-year period 1971-1972, symposia on radioisotope techniques in mining and ore-processing and in the basic metals industries, panels on specific applications of large radiation sources and mining, study groups on nuclear geophysics and activable tracer techniques, and consultants' meetings on radioisotope power sources are planned. A regional training course on industrial applications of radioisotopes and radiation is also proposed. Laboratory activities to cover pilot radioisotope studies of industrial effluent and sewage disposal and the preparation and distribution of mineral standards for radioisotope X-ray fluorescence are envisaged.

230. Activities contemplated for 1973-1974 include meetings to cover the utilization of radioisotopes and radiation in the food, oil, chemical, power, transportation and communications industries. It is expected that the use of radioisotopes in road and dam construction will require special attention and that laboratory activities and field services will have increased to meet the needs of developing countries.

Explanation of costs changes (1968/1969)

231. As shown in Table 12, the cost of the Agency's physical sciences programme is expected to increase by 8.47% in 1969. The explanation of the major causes of this increase is given below by objects of expenditure.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$290 500	$339 300	$48 800 = 16.80%
Common staff costs	$103 000	$120 400	$17 400 = 16.89%

232. As shown in the manning table in Annex II, it is proposed to increase the staff for this programme from its present complement of 37 posts (21 Professional and 16 GS posts) to 41 posts (24 Professional and 17 GS posts) in 1969.

233. Reclassification of one existing P-4 post to the P-5 level for a senior groundwater hydrologist is proposed because it has proved to be impossible to recruit a suitably qualified specialist in this technical field at a lower grade and the increased requests for advice and assistance require proper attention.

234. The provision of three Professional posts and one GS post is proposed to support the expansion in the Agency's work relating to nuclear data. A P-4 post, two P-3 posts and one supporting GS staff member are needed for data processing and development of standards.

235. All other salary and wage cost increases are due to the post adjustment granted to Professional staff members in 1968 but not reflected in the 1968 budget, and salary increases granted to GS and M&O staff members in 1968.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$222 500	$208 500	($14 000) = (6.29%)

236. The net decline in all costs other than those in respect of "Salaries and wages" and the associated "Common staff costs" is due to a reduction of $11 500 in the estimated cost of "Seminars, symposia and conferences", a reduction of $8000 for "Duty travel and missions" and a minor reduction of $2000 for research contracts, partially offset by an increase of $7500 for five panels and a meeting of INDC.

237. The expenditure in respect of "Scientific and technical services" for the two years is made up as follows:

Item	1968	1969
Research contracts:		
Nuclear physics and radiation chemistry	$15 000	$15 000
Radioisotope applications in water resources development	55 000	52 000
Radioisotope applications in industry	21 000	21 000
Sub-total	91 000	88 000
Technical contracts:		
Hydrological contracts	14 000	15 000
TOTAL	$105 000	$103 000

5. THE LABORATORY

Summary of costs

Table 13

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	458 114	490 000	55 500	545 500	35 000	580 500
Common staff costs	149 631	170 000	5 000	175 000	10 000	185 000
Duty travel	3 060	5 000	(1 000)	4 000	1 000	5 000
Scientific and technical supplies and services	76 762	70 000	-	70 000	5 000	75 000
Common services and non-technical supplies	97 932	90 500	4 500	95 000	3 000	98 000
Scientific equipment and minor capital additions	86 864	94 000	(12 500)	81 500	8 000	89 500
Co-operative programme with FAO	-	50 000	(50 000)	-	-	-
TOTAL	872 363	969 500	1 500 0.15%	971 000	62 000 6.39%	1 033 000
Source of funds:						
Operating Fund I	244 718	229 500	13 500	243 000	15 000	258 000
Regular Budget	627 645	740 000	(12 000)	728 000	47 000	775 000
TOTAL	872 363	969 500	1 500	971 000	62 000	1 033 000

Programme

Highlights

238. This part of the programme covers the work of the Agency's Laboratory at Seibersdorf and the laboratory activities carried out at the Agency's Headquarters in Vienna. In accordance with established practice the costs of laboratory activities are controlled on a cost accounting basis, which for the past few years has resulted in charging approximately 75% of total laboratory costs to the Regular Budget, for activities considered to be of general benefit to the entire membership, and the balance to the Operational Budget, as being more local or regional in benefit.

239. The budget estimates for 1969 and the preliminary estimate for 1970 have been prepared on the assumption that there will be no major change in this percentage distribution during the next biennial period. However, in respect of 1970 and subsequent years

the Board is giving consideration to the desirability of recommending to the General Conference that, depending upon the recommendations which will be made in the review of the Laboratory's programme, a greater part of the laboratory expenses should be met from the Regular Budget, because a larger part of the work performed in the Laboratory might now reasonably be considered as of benefit to the membership at large. Any further shift in emphasis in support of Agency safeguards would strengthen this trend. Such a change would be of financial benefit to developing countries inasmuch as it would make approximately $175 000 more available per year to Operating Fund II for further technical assistance.

240. As explained below, the Laboratory's programmes of metrology and chemistry, agriculture, medical physics, and hydrology are largely in support of other programmes explained elsewhere in this document. In 1969 the only staff increases proposed are two GS and two M&O posts. All other increases in respect of salaries and wages and common staff costs are attributable to the post adjustment and salary increases during 1968. A reduction of $50 000 is due to non-recurrence of expenditure in respect of the FAO/IAEA joint fly rearing facility in the 1968 Regular Budget.

241. Although the work of the Laboratory was reviewed by SAC in January 1968, a thorough review will again be carried out in October 1968 by a group consisting of scientific and administrative experts, and its recommendations will be reported to the Board and borne in mind in developing future programme proposals.

Metrology and chemistry

The programme for 1969-1970

242. Increasing support will be given to safeguards activities, particularly in analytical chemistry. The Laboratory will collaborate in future inspections of nuclear fuel processing and fabrication plants by preparing reference samples and conducting necessary analyses and physical controls of instruments, etc.; laboratory staff will participate in a safeguards panel to be convened in 1969 to discuss safeguards methods and techniques. In addition, the Laboratory will compare and contrast various methods of plutonium analysis. An increase is expected in the demand for bio-assay for plutonium for Agency inspectors on their return after working in fuel reprocessing and fabrication plants.

243. Atomic absorption spectroscopy for determining the isotopic composition of uranium and possibly plutonium is a promising possibility for safeguards work; investigations into the development of a portable apparatus will be made.

244. Under the analytical quality control programme the following types of samples may be provided in 1969 and 1970 to laboratories in Member States to check their analytical procedures:

(a) Homogenized environmental materials containing artificial or natural radionuclides;

(b) Materials containing trace elements to be determined by neutron activation analysis and other techniques;

(c) Agricultural and food materials containing toxic compounds such as mercurials (in co-operation with FAO);

(d) Materials used in reactor technology; and

(e) Samples for checking radioactive dating techniques.

245. Some activities in the programme, particularly with regard to reactor technology, will be guided by the panels convened in 1969 by the Division of Nuclear Power and Reactors to review past work and recommend new projects. This programme is closely connected with interlaboratory comparisons of analytical techniques, which provide a very profitable subject for panel discussions.

246. In line with recommendations by WHO, analysis of commercial radioisotope preparations will continue, and information concerning analytical methods, impurities, rates of self-decomposition and other pertinent facts will be supplied to WHO, to be used together with other facts at their disposal, for the establishment of recommended specifications. Ad hoc discussions on the purity of radiochemical preparations are planned for 1969.

247. WHO has asked the Agency to help in the development of analytical methods for advising on the problem of contamination of man's environment with mercury. The problem is becoming more acute and is already severe in several countries; it arises through the use of mercurial compounds as fungicides, slimicides and seed treatment preparations. The banning of the use of mercurials would cause great difficulties in agriculture as at present no other equally effective seed dressing preparations are available. It is therefore important to obtain more information about the accumulation and decomposition of such compounds in soil and in plants. Because of the very small quantities involved, institutions having access to activation facilities will be encouraged to obtain local data on mercury levels in foodstuffs which could be supplied to WHO and FAO as a contribution to a world-wide appreciation of the problem.

248. Distribution of calibrated radioactive standard samples will continue. However, since increasing numbers of standard radionuclide samples are becoming available from other suppliers, the Laboratory will concentrate on a relatively small number of items, which are not on the market, and for which a fair demand can be expected, for instance mCi-sized sources for dosimeter calibrations.

249. At present, standards of the numerous radionuclides fabricated at different institutes and times are rarely compared. Moreover, standard sources of short-lived radionuclides quickly become useless. Whereas the calibration in absolute units, i.e. curies, is tedious and in most cases subject to relatively large errors, it is possible to compare the activity of solutions with a precision of 0.1% or better. Apparatus for relative measurements, meeting the requirements of long-term stability, will be set up for the comparison of gamma- and beta-emitting radioactive solutions. Standardized samples will be collected and the detection efficiencies of the apparatus will be compared with the response of a long-lived standard. The results for all important radionuclides will be made available to interested institutes and supplemented at regular intervals. Because all these results depend on the radionuclidic purity of the samples, methods for purity checking have to be refined.

250. The Laboratory will continue to investigate suitable methods for reactor neutron fluence measurement and offer advice on their use to laboratories in Member States. It is planned to provide activation detector materials with quite different energy dependence and also calibrated standards for the activity assay of the irradiated detectors. The set of equations to be solved for obtaining the differential flux densities can most easily be solved by an appropriate computer programme. The Laboratory will, therefore, endeavour to establish such programmes.

251. For very short-lived radionuclides with a half-life of less than one day or so the transfer of standard samples from one laboratory to another is not practicable. However, if a simple and robust, but precise and stable, device for relative measurements were available, it could be sent, with or without a specialist, to distant institutes. This would be of interest to reactor centres, where short-lived nuclides can be used very conveniently as fluence monitors, and in medical work, where many short-lived nuclides are used.

252. Subject to the availability of funds, a short training course on the organization of surveys for radionuclides in food is planned; this course, it is assumed, will receive the support of FAO.

253. Services, both practical and advisory, to Member States and United Nations organizations such as UNSCEAR, WMO and WHO will be continued to the extent possible. The demand for analysis of filters, soils and other environmental materials for radioactive contamination is expected to decrease.

254. All the aforementioned services will continue in 1970, but the following trends are expected:

(a) Services in respect of safeguards will grow. In particular, if inspections of fuel fabrication and reprocessing plants increase appreciably, and if it is decided that the analytical work involved should be carried out in an Agency laboratory, further space suitable for handling plutonium will have to be provided as the present plutonium laboratory is suitable for two analysts only; depending upon the work-load involved, additional personnel for analysis may be required; and

(b) In analytical quality control, it is expected that in some areas more emphasis will be placed on the comparison of analytical methods rather than on the supply of new reference materials; a panel may be convened in 1970 to evaluate results obtained under this programme and to advise on its continuation in 1971-1974.

255. The increased work relating to the industrial applications of radioisotopes has shown that, for instance, WHO has an appreciable number of projects dealing with problems of sewage and waste disposal for which the radiotracer technique is considered a suitable method of investigation. In cases where no suitable local personnel or experts are available, an Agency staff team could be used to carry out the experiments; this would not be a continuous operation, but could be done by withdrawing laboratory personnel temporarily from other projects.

256. A training course on the bio-assay of radionuclides is proposed for 1970, subject to availability of funds.

The programme for 1971-1974

257. With regard to the period 1971-1974, the work will, of course, depend on technological changes which may take place. However, the following trends are foreseen:

(a) An increasing emphasis on safeguards problems;

(b) The conservation and comparison of radioactivity standards are expected to become a most important task; absolute standardization work will continue, and some selected radionuclides, for which no standards are available from elsewhere, will be distributed on the basis of the Agency's standards;

(c) As recommendations concerning radioisotope preparations, particularly those used for clinical applications, are established, emphasis will be placed on improved methods of analysis, mechanisms of radiolytic decomposition and simple methods of purification from decomposition products; and

(d) The work of analytical quality control will expand to include analytical methods, reference material and intercomparisons of other important elements and compounds; the work will continue in close co-operation with other international and non-governmental organizations.

Agriculture

258. This work is completely co-ordinated with that of the Joint FAO/IAEA Division, as it serves as the laboratory arm in the work of that Division.

The programme for 1969-1970

259. During 1969, the co-ordinated field programmes relating to maize will be terminated and the one dealing with rice will be reduced to a minimum; the contractors will, however, continue to carry out field and greenhouse experiments and it is expected that the Laboratory will assist in carrying out the analyses of nitrogen-15 as well as of radio-isotopes in soil and plant material.

260. With regard to the co-ordinated field programme on the efficiency of fertilization of tropical and sub-tropical fruit trees, the Laboratory will be required to devote an appreciable amount of time to the preparation and distribution of labelled materials and the analysis of samples.

261. The co-ordinated wheat programme will by 1969 have reached its maximum development and large numbers of samples will have to be dealt with by the Laboratory for the analysis of nitrogen-15 and phosphorus-32; the fertilizers for this programme will be distributed by the Laboratory.

262. Greenhouse and field trials will be carried out for the programme on pesticide residues in field crops.

263. Preliminary field experiments to be carried out in Austria, Hungary and Yugoslavia, in particular for the wheat, irrigation and tree programmes, will continue, as will greenhouse work related to the co-ordinated programmes. Laboratory work on nitrogen uptake by crops and the fate of nitrogen fertilizers in soil will also continue. Training for three to four trainees will be provided; this will be related to the field programme and include laboratory, greenhouse and field work.

264. With regard to the co-ordinated rice mutation programme in Asia, mutagen treatments and the use of screening techniques for mutant selection will continue. Support will be provided for the co-ordinated neutron seed irradiation programme with a view to developing proper neutron dosimetry and research on neutron radiosensitivity and the efficient induction of mutations in crop plants; research will continue on efficient mutagen treatment methods for induction of mutation in the main crop species such as rice, cereals and legumes. The carrying out of mutagen treatments for Member States is likely to increase.

265. The improvement of techniques of mass-rearing, sterilization, packaging and shipment of Mediterranean fruit flies and olive flies will continue to be a standard part of the programme. Requests from Member States to assist in preliminary work for eradication of specific insect pests will be given careful consideration.

266. In 1970, the programme will be an extension of that for 1969, apart from activities which are expected to terminate; these will be replaced by other projects and some current work will be intensified, as indicated below:

(a) The co-ordinated fertilizer efficiency-irrigation programme will require the analyses of samples for nitrogen-15 and radioisotopes; facilities for work with the neutron moisture probe will be developed;

(b) In view of the demand for high-protein crops, screening methods will be developed for the selection of mutants with improved protein quality and quantity; and

(c) With the new facilities available investigations of techniques for control of insect pests by the sterile-male technique will be expanded. Test insect species will probably include the olive fly, tsetse fly and codling moth. In addition to standard sterile insect release techniques, co-operative programmes with other institutions will have developed to permit comparisons of techniques of insect eradication, involving the combined use of chemosterilants and specific sex-lures. Use will be made of labelled food material and activation analysis. The programme for training nationals of developing countries in the principles and techniques of the sterile insect eradication methods will be intensified.

The programme for 1971-1974

267. The Laboratory will continue to service the Joint Division's programmes, in particular those related to crop nutrition, plant breeding and entomology. The increasing demand for food preservation may also require laboratory services. In-service training will remain a priority in all aspects of the Laboratory activities.

Medical physics

268. It is intended to integrate as closely as possible the programmes of the Medical Physics Laboratory and the Section of Nuclear Medicine. Many of the Laboratory's activities will therefore relate directly to research contracts, training, and meetings which are described more fully in the programme in Life Sciences above [11]. The main objectives are to provide support for the work of laboratories in Member States and selected services for other units of the Agency's Laboratory.

The programme for 1969-1970

269. During 1969 the Agency's whole-body counter will continue in active use for several projects. Examinations for internal contamination with radionuclides will be performed on staff members of the Agency's Laboratory, on safeguards inspectors before and after inspection trips, and (as a contribution towards the sharing of facilities with the Austrian Atomic Energy Research Organization) on personnel at the reactor centre. Measurements will continue on Thorotrast cases and other people in the Vienna area who have been subject to radioactivity through medical or occupational internal exposure. On the basis of the detailed comparison of whole-body counting instruments and methods already devised in the Laboratory, support and advice will be provided to laboratories under Agency research contracts or agreements. The specific projects are expected to include the measurement of occupationally acquired radium and strontium-90 burdens, naturally occurring thorium series burdens, and the study of various medical problems in mineral and protein metabolism.

270. Supplementary dosimetric measurements will be continued in the study of Vienna Thorotrast cases. Thorium series radionuclides will be measured in tissue samples that become available at autopsies in order to refine organ dose estimates. Collaboration will be maintained with Viennese scientists studying chromosome aberrations in the

[11] See paras 122-138 above.

peripheral blood cells of such cases under a WHO research contract. Co-operation will continue with other laboratories attempting to build up the world pool of Thorotrast cases available for investigation.

271. From a research co-ordination meeting on the nuclear medicine research contract programme and a panel on radioisotope techniques in the study of trace elements and mineral metabolism in man, both of which will take place in 1968, a co-ordinated research programme is expected to emerge for the study of various trace elements in conditions of malnutrition and disease. The Laboratory will participate in this programme by providing samples for interlaboratory comparisons, performing measurements where local analytical facilities are unavailable or inadequate and helping with the development of methods.

272. The Laboratory will continue to assist in the co-ordinated research programme on the use of radioisotopes in the study of protein malnutrition in tropical and sub-tropical regions, for the earlier stages of which special radioisotopically-labelled proteins were prepared for interlaboratory comparisons and advice was supplied on such techniques as whole-body counting.

273. The programme to evaluate instruments for radioisotope scintigraphy is expected to be concluded during 1969. Radioisotope localization techniques, one of the most intensively investigated fields in nuclear medicine, have produced many commercial instruments of varying price and performance. The Laboratory has developed broadly applicable methods for comparing these devices - particularly their radiation detection heads - and has applied them to typical instruments; radioactive phantoms have been constructed and supplied to manufacturers for systematic tests. The information acquired is of general interest, but it is particularly important in the selection of instruments for the Agency's training activities.

274. Training will continue to be provided in whole-body counting, neutron activation analysis, and other measurement techniques. In particular, the Laboratory will do the necessary work for the study tour on in vivo measurement techniques proposed for 1969 [12].

275. In 1970, the various projects in whole-body counting, the assay of trace elements, and - on a reduced scale - the dosimetric measurements on Thorotrast cases will be continued. It is expected that one or more new projects concerned with measurement techniques for radionuclides in nuclear medicine will be initiated in 1970. These will be selected on the basis of the needs of the research contract programme as formulated at a research co-ordination meeting in 1968. They may include interlaboratory comparisons and the adoption of methods in specialized measurement procedures, such as saturated analysis and radio-immuno-assay.

276. During 1971-1972, the whole-body counting and trace element analysis programmes will be continued, but the emphasis will be shifted according to the overall needs of the Agency's programmes. New projects started during 1970 will in all probability be continued.

277. It may be assumed that, by 1973-1974, the opportunities and demands for technical laboratory work in medical physics will have expanded greatly, since nuclear medicine is now developing very rapidly. The Laboratory will continue to support work in the developing countries through the evaluation of techniques and instruments, the supply of special calibrated materials, the arrangement of interlaboratory comparisons and through training.

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[12] See para. 130(b) above.

Hydrology

278. In regard to water resources development the work of the Laboratory will continue on the following three main lines:

(a) The provision of analytical services for measuring tritium, carbon-14, deuterium and oxygen-18 in natural waters;

(b) The development of improved analytical methods suitable for routine operation including the intercomparison of environmental isotopes; and

(c) The operation of a field demonstration and experimental service.

The programme for 1969-1970

279. In the hydrology programme proposed for 1969 [13] reference is made to the lack of analytical facilities as a major handicap to the maximum utilization of isotope techniques in hydrology in developing countries. A long-term solution has been proposed, but in the meantime there is need for an expansion of the Agency's facilities to meet demands for analysis of the natural content of deuterium, oxygen-18, tritium and carbon-14 in water samples. At present the demands indicate a doubling of analytical work every three years. The analytical services are used to obtain basic data from the joint IAEA/WMO precipitation survey and to measure water samples obtained from field studies. These studies are made in UNDP/SF projects under sub-contractual arrangements with the respective executing agencies and directly with Member States, either within the framework of the IHD or with national hydrological authorities.

280. The growth in the number of deuterium, oxygen-18, tritium and carbon-14 analyses will require an increase in equipment.

281. It is also proposed to establish a mobile pool of radioisotope instruments for hydrological field work, to be used primarily for:

(a) Demonstration of isotope techniques in hydrology and application to small-scale problems on request from Member States; and

(b) Provision of field demonstrations in international hydrological training courses where the Agency provides lectures and demonstrations on isotope techniques in hydrology.

This mobile pool of equipment could be established over the two-year period 1969-1970; the acquisition of a small number of existing field instruments would involve a minor outlay in 1969.

282. It is proposed to repeat earlier intercomparisons of measurements of natural levels of tritium and natural variations of deuterium and oxygen-18 in water samples. This will be particularly important in view of the establishment of new national laboratories for measuring these isotopes.

283. The development of new analytical methods for tritium and carbon-14 in water and the experimental comparison of different methods are important because it is essential that the Agency's Laboratory remain up to date and, secondly, because the Agency advises Member States on their hydrology programmes and very often on the establishment of new tritium and carbon-14 laboratories - also under the technical assistance programme - and trains, on an average, four fellows each year.

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[13] See paras 204-223 above.

284. In 1970, the second phase of the increase in the Laboratory's analytical services would require an additional system for analysis of the carbon-14 content of natural waters. Similarly, the establishment of the mobile pool would require additional funds. By 1970 the field demonstrations and experimental service for the use of isotope techniques in hydrology are expected to have proved their usefulness and will indicate the extent of future activity by the Agency.

The programme for 1971-1974

285. Future activities during the period 1971-1974 will most likely follow the same general lines. Regional or national isotope hydrological centres would, however, need close co-ordination with the Agency's facilities, particularly in the beginning, when Agency laboratory staff may be required to advise and help put the laboratories into operation.

Explanation of cost changes (1968/1969)

286. The Laboratory is administratively under the Division of Research and Laboratories but it maintains in nearly all fields of activity close relations with other Divisions because its activities are an integral part of various programmes of the Agency; for instance, close co-operation exists between the Agricultural Section and the Joint FAO/IAEA Division, and the Medical Physics Section works closely with the Division of Life Sciences.

287. As shown in Table 13 above it is estimated that the total cost of the Laboratory programme will increase from $969 500 in 1968 to $971 000 in 1969, or an increase of 0.15%. The preliminary estimate for 1970 provides for a further increase of $62 000 or 6.39% to provide additional support to safeguards, agriculture, hydrology and training activities. Major increases in 1969 costs are explained below:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$490 000	$545 500	$55 500 = 11.3%
Common staff costs	$170 000	$175 000	$ 5 000 = 2.9%

288. The proposed manning table for the Laboratory in 1967 in Annex II provides for reclassification of one Professional post from the P-2 to the P-3 level, and for the addition of two GS and two M&O supporting posts. The estimated breakdown of the salaries and wages costs of the Laboratory, in the same form as is given in Table 50 of the Regular Budget for other staff members, is shown in Table 14 below.

Table 14

1967	1968	1969	Position	1967 $	1968 $	1969 $
5	5	5	P-5 Senior Officer	65 550	65 550	65 550
8	10	10	P-4 First Officer	85 840	107 300	107 300
6	6	7	P-3 Second Officer	53 334	53 334	62 223
8	7	6	P-2 Associate Officer	58 296	51 009	43 722
1	1	1	P-1 Assistant Officer	5 690	5 690	5 690
28	29	29	Sub-total	268 710	282 883	284 485
45	51	53	General Service staff	135 000	158 100	176 225
16	17	19	Maintenance and Operatives Service staff	27 360	30 600	37 050
89	97	101	TOTAL	431 070	471 583	497 760
			Post adjustment	-	-	15 000
			Salary increments	20 356	18 217	24 490
			Sub-total	451 426	489 800	537 250
			Less: Recruitment lapse and lag factor	-	1 800	-
			Sub-total, established posts	451 426	488 000	537 250
			Add: Consultants	-	2 000	4 350
			Overtime	3 635	-	3 450
			Temporary assistance	3 053	-	450
			Sub-total	6 688	2 000	8 250
TOTAL, Salaries and wages				458 114	490 000	545 500

289. The Professional post which it is proposed to regrade from P-2 to P-3 is in the Medical Section. The study of trace elements will by 1969 require a wide range of skills in the use of physical techniques of radiation detecting and chemical element separation procedures, biochemical knowledge in guiding the programme, and administrative skills in co-ordinating the associated research contracts programme. To attract a staff member of the desired level of competence, a P-3 post will be required.

290. The provision of one new GS post is proposed to permit the employment of an additional technician to cope with the increased analytical work-load of the Laboratory. The other new GS post is required in the Metrology Section in respect of the programme for the provision of radioactivity standardization services and the proper maintenance of the new radioactive storage facility.

291. The construction of the new FAO/IAEA fly-rearing facility at Seibersdorf will require one additonal M&O post for a cleaner, since constant attention to cleanliness is essential in the operation of such a project. The other new M&O post is required to provide manual labour for the plant-breeding section, which has much field work and other requirements for manual labour that is now partially performed by GS and Professional officers.

292. The estimated increase of $55 500 in salaries and wages in 1969 is summarized in Table 15 below.

Table 15

Reason for increase	Amount $
Reclassification of existing Professional post	1 602
Additional two General Service category posts	6 650
Additional two Maintenance and Operatives Service category posts	3 900
Salary and wage increases:	
General Service staff	11 475
Maintenance and Operatives staff	2 550
Provision for a post adjustment for Professional staff	15 000
Within-grade salary increments	6 273
Plus recruitment lapse and lag factor	1 800
Sub-total, established posts	49 250
Consultants	2 350
Overtime of staff	3 450
Temporary assistance	450
Total increase	55 500

293. The increase of $2350 for consultants is required for the mass-spectrometric work of the Laboratory concerning stable isotopes in hydrology. A provision of $3450 is made for 1969 for overtime of staff based on actual expenditures of $3635 in 1967, whereas the 1968 budget makes no provision for such costs. A minor allowance of $450 for temporary assistance is provided in 1969, as compared with actual expenditures of $3053 in 1967 and no provision for such costs in 1968.

294. The increase in "Common staff costs" is closely related to the increase in "Salaries and wages" for GS and M&O staff and the additional posts outlined above. In the light of 1967 experience the 1968 budget is too high for this item, so the increase in the 1969 budget is minimized.

All other costs	1968 budget	1969 estimate	Increase in 1969
Fly-rearing facility	$ 50 000	-	($50 000) = (100.0%)
Other	$259 500	$250 500	($9 000 = (3.47%)

295. All items of expenditure for the Laboratory, other than "Salaries and wages", "Common staff costs" and the fly-rearing facility, are expected to decrease by a net amount of $9000 in 1969. This decrease is made up of reductions of $12 500 for scientific equipment and $1000 for duty travel, partially offset by an increase of $4500 for common services and non-technical supplies.

296. The estimate for common services, supplies and equipment includes building operating costs, communication expenses, non-scientific material and transportation costs. Taking into account actual cost experience in 1967, increased public utility charges and the construction of the fly-rearing facility, this $4500 increase is considered essential.

297. For information, the activities carried out under the Laboratory programme are summarized in Table 16 below.

Table 16

	Projects	Actual 1967 $	Budget 1968 $	Increase or (decrease) 1968/1969 $	Estimate 1969 $
I.	METROLOGY AND CHEMISTRY				
	Standardization of measurement and analytical methods related to nuclear energy applications				
1.	Calibration of radionuclides	148 662	155 000	5 000	160 000
2.	Radiation dosimetry	20 291	26 000	(3 000)	23 000
3.	Reference materials	26 511	25 500	(15 500)	10 000
4.	Analytical quality control	78 802	86 000	-	86 000
5.	Support to safeguards	60 951	70 000	15 000	85 000
6.	Chemical and physico-chemical investigations	38 758	57 000	(17 000)	40 000
	Sub-total	373 975	419 500	(15 500)	404 000
II.	NUCLEAR ENERGY APPLIED TO AGRICULTURE				
1.	Soil fertility irrigation and crop production	84 745	98 000	2 000	100 000
2.	Co-ordinated fertilizer efficiency-irrigation programme (analysis of samples for nitrogen-15 and radioisotopes)	17 330	16 000	4 000	20 000
3.	Genetics and plant breeding	29 649	35 000	5 000	40 000
4.	Entomology	45 794	60 000	-	60 000
	Co-operative FAO project	-	50 000	(50 000)	-
	Sub-total	177 518	259 000	(39 000)	220 000
III.	NUCLEAR ENERGY IN MEDICINE				
1.	Development of techniques and instrumentation				
	Medical activation analysis	20 460	20 000	5 000	25 000
	Radioisotope scanning and protein turnover	18 448	20 000	-	20 000
	Whole-body counting	10 767	10 000	2 000	12 000
2.	Study of toxicity of Thorotrast cases	15 447	8 000	-	8 000
	Sub-total	65 122	58 000	7 000	65 000
IV.	NUCLEAR ENERGY IN HYDROLOGY				
1.	Improvement and development of methods	58 527	16 000	31 000	47 000
2.	Determination of isotopic composition of natural water	18 366	24 000	6 000	30 000
3.	Surface and groundwater investigations	14 507	10 000	10 000	20 000
4.	Analytical services to Member States	16 367	23 000	2 000	25 000
5.	Participation in the IHD	21 809	18 000	7 000	25 000
	Sub-total	129 576	91 000	56 000	147 000
V.	TRAINING OF FELLOWS FROM MEMBER STATES	37 659	62 000	(17 000)	45 000
VI.	DEVELOPMENT OF INSTRUMENTS AND WORKSHOP SERVICES	40 447	56 000	(16 000)	40 000
VII.	PREPARATION OF REPORTS AND PAPERS	48 066	24 000	26 000	50 000
	TOTAL	872 363	969 500	1 500	971 000

6. INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

Summary of costs

Table 17

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Scientific Council	470	5 000	-	5 000	-	5 000
Salaries and wages	111 237	111 000	2 000	113 000	3 000	116 000
Common staff costs	29 251	30 000	1 500	31 500	1 500	33 000
Visiting scientists	175 603	114 000	(14 000)	100 000	30 500	130 500
Guest lecturers	4 666	8 000	2 000	10 000	-	10 000
Duty travel	7 159	10 000	-	10 000	-	10 000
Conferences and seminars	62 404	100 000	(65 000)	35 000	10 000	45 000
Scientific and computer services	7 420	10 000	-	10 000	2 000	12 000
Library	11 341	12 000	500	12 500	1 000	13 500
Publications	15 736	8 000	-	8 000	2 000	10 000
Common services, supplies and equipment	45 081	21 000	39 000	60 000	5 000	65 000
Hospitality	3 281	1 000	1 500	2 500	-	2 500
Fellowships	50 450	62 500	-	62 500	-	62 500
Associate members	8 976	25 000	-	25 000	-	25 000
Federated institutions	3 245	15 000	-	15 000	5 000	20 000
TOTAL	536 320	532 500	(32 500)	500 000	60 000	560 000
Source of funds:						
Regular Budget, Section II	115 000	115 000	-	115 000	35 000	150 000
Operating Fund I	421 320	417 500	(32 500)	385 000	25 000	410 000
TOTAL	536 320	532 500	(32 500)	500 000	60 000	560 000

Programme

Highlights

298. The International Centre for Theoretical Physics was established by the Agency in 1964 as a co-operative venture with the Italian Government to serve as a research and training centre for young theoretical physicists, especially those from developing nations. In February 1967 the Board decided to continue this arrangement for an additional six years. It was expected that the Italian Government would contribute up to $250 000 per year on a matching basis; that is, the Italian contribution would be equal to all other resources of the Centre up to a total of $250 000. The Board noted that the annual budget of the Centre should, if possible, be at least $500 000, and decided that the Agency should contribute approximately $150 000 each year.

299. During 1967 the first part of a special grant of support from the Ford Foundation was received. This grant amounts in total to $200 000 over a three-year period starting from 1 July 1967, and must be used for specific purposes in support of conferences, associate members and federated institutions. The first $40 000 was received in 1967, an additional $105 000 will be provided in 1968, $45 000 and $10 000 in 1969 and 1970 respectively.

300. During the past few years UNESCO has also supported the Centre in an amount of about $27 500 per year in the form of fellowships and support to the Advanced School of Physics of Trieste University. In order to ensure full financing of the Centre at the minimum level recommended by the Scientific Council and generally supported by the Board for the future, the Director General has begun negotiations with UNESCO to obtain increased support for the Centre which would assure full matching of the Italian Government contribution and would also ensure the availability of annual operating resources of at least $500 000 in terms of 1967 price levels for the balance of the six-year period covered by the new agreement. It now appears likely that the International Centre for Theoretical Physics will become a joint IAEA/UNESCO centre with effect from 1970.

301. The budget estimates for 1969 are based on the assumption that it will be possible to obtain sufficient funds from sources other than the Agency in 1969 to reach the level of $250 000 required fully to match the Italian pledge. It is hoped that this may be possible by utilization of the portion of the Ford Foundation grant available in 1969, plus additional pledges from other sources which are as yet not entirely firm. If such resources do not materialize, the 1969 programme will have to be reduced to the level for which funds are available. The preliminary estimates for 1970 are consistent with the UNESCO budget for that year, which assumes a $150 000 contribution from the regular budget of each agency.

The programme for 1969-1970

302. The programme of the Centre covers research and training for research in the main branches of theoretical physics: high- and low-energy physics, plasma physics and solid-state physics and related disciplines. The Centre's functions are:

(a) To train young physicists for research, especially those from developing countries;

(b) To help in fostering the growth of advanced studies of theoretical physics, especially in developing countries;

(c) To conduct original research; and

(d) To provide an international forum for personal contacts between theoretical physicists from countries at all stages of development.

303. In accordance with these objectives, the Centre will consolidate the work done during the first four years by providing training for research and opportunities for conducting research to scientists from both developing and developed countries, with particular emphasis on the needs of the former.

304. The Centre's aim is to provide facilities for scientists from developing countries to enable them to keep abreast of modern thought and developments in ways which do not prevent their permanent residence abroad. The Centre's academic year is normally divided into two main sessions; one is devoted to research and one to an extended seminar leading to research.

305. During 1969-1970 the Centre plans to hold two extended seminars: one on theoretical nuclear physics in the latter part of 1969 and one on solid-state physics in the latter part of 1970. At each of these an international faculty of 20-25 lecturers will gather with an audience of 80-100 participants for a period of 10-12 weeks. One of the seminars may be held in a developing country if an appropriate invitation is received.

306. The session devoted to research seeks to bring together a group of senior visiting scientists from developing as well as developed countries and a number of research fellows with prior experience in research from developing countries, and to let them live and work together for a period of six months or more. Two such groups, one devoted to nuclear theory and the other to high-energy physics, will work concurrently every year, with an additional group on plasma physics in 1969.

307. The success of, and the number of participants from, developing countries in the course on condensed matter held during the latter part of 1967 has encouraged the Centre to envisage a programme in solid-state physics, in collaboration with the federated institutes (see paras 308-309) during the years 1968, 1969 and 1970, which will conclude with the solid-state course to be held in the latter part of 1970. Elaboration of the programme is under study. The number of visiting scientists and research fellows will be of the order of 50-60.

308. Under a federated institutes scheme, an agreement is made whereby an institute may send physicists for a total of forty man-days per year, travel expenses usually being borne by the federated institutes and the Centre paying a per diem allowance. It is hoped that these institutes will eventually forge a partnership facilitating the sharing of academic staff, visitors and other facilities. It is envisaged that an occasional session or an extended seminar of the Centre may be held in one of its federated institutes. There are now seven federated institutes and their number is expected to double by 1969.

309. The function of the Centre could also be to gather information about the status of science in the different federated institutes of a given area and to encourage and facilitate contacts and collaboration between groups and individual scientists from these institutes, which could, without financial burden to the Centre, be of great benefit to the development of the scientific communities of some developing areas, especially in Africa and Asia. At the request of the Centre, some of the scientifically advanced federated institutes - in Prague and Budapest - have offered fellowships for short periods to physicists from developing countries who have already been to the Centre or who are about to go there. It is foreseen that similar opportunities will be offered by other institutes.

310. The Centre also operates a scheme of "Associate Members". Associate Members are appointed by the Director General on the recommendation of the Scientific Council of the Centre, from among distinguished physicists living and working in developing countries. They are entitled to spend from one to four months every year at the Centre at times of their own choosing, their fares and living expenses being met by the Centre. Appointments are made for a three-year period. This scheme is the chief way in which the Centre hopes to staunch the flow of active physicists from developing countries. The Associates will number 20 by the end of 1968. This figure will probably remain unchanged during the period 1969-1970.

311. The Advanced School of Physics of the University of Trieste continues to conduct lectures at the graduate level; a diploma is awarded to fellows who pass the examination and write a thesis.

The programme for 1971-1974

312. For the two-year period 1971-1972 it is planned that an extended seminar on plasma physics and astrophysics will be organized in 1971 and one on nuclear physics or high-energy physics in 1972. Two research groups of 50-60 scientists in different fields will be set up during that period; it is possible that a research group in solid-state physics may be formed.

313. In 1973-1974 the Centre will continue its training activity through extended seminars and courses and through the Advanced School of Physics, while research will be carried out in nuclear physics, solid-state physics and high-energy physics at the same level as previously.

314. The Centre's assistance to developing countries should be increased by extending the associateships and the federated institutes schemes. It is hoped that 21 institutes will be included in the latter scheme. It is expected that in these years the Centre's catalyzing role in regard to scientific co-operation in some of the developing countries will be further increased by holding seminars and courses.

Explanation of cost changes (1968/1969)

315. Before explaining the specific changes in costs expected in 1969, it may help to clarify the financial aspects of the Centre if a summary of the estimated resources in the period 1968-1970 is given to show the apportionment of costs between the Agency's Regular and Operational Budgets. All resources from other than Agency funds are shown under the Operational Budget, since these contributions are for specific support to the Centre and may be carried forward into the next year if not utilized, whereas any unobligated funds under the Regular Budget would be returned to all Member States in accordance with the Financial Regulations [14]. The budget assumes that the resources shown below will be available to the Centre in 1968 to 1970 inclusive.

Table 18

Source of funds	1968 $	1969 $	1970 $
IAEA Regular Budget	115 000	115 000	150 000
Operational Budget:			
Italian Government contribution	250 000	250 000	250 000
IAEA Operating Fund II (fellowships)	35 000	35 000	-
Ford Foundation	105 000	45 000	10 000
UNESCO (and others)	27 500	55 000	150 000
Sub-total, Operational Budget	417 500	385 000	410 000
TOTAL	532 500	500 000	560 000

[14] INFCIRC/8/Rev. 1.

316. As indicated in Table 18 above, it is proposed that from 1970 onwards the entire Agency contribution to the Centre, amounting to $150 000 per year, will be obtained from the Regular Budget on the same basis as that now planned by UNESCO. This will allow an additional $35 000 of the limited resources available for technical assistance under Operating Fund II to be utilized for technical assistance projects or training elsewhere. The Centre will be a Joint IAEA/UNESCO Centre and all funds from both agencies and the Italian Government will be unrestricted as to use so that the programme may be planned on an effective and flexible basis without being restricted by special earmarkings of some resources for certain purposes.

Reduction in 1969 costs

317. As shown in Table 17 above, the 1969 budget estimates are based on a reduction of $32 500 from the 1968 level. This results from a reduction in the grant by the Ford Foundation which provided a special sum in 1968 for the large International Symposium on Contemporary Physics. Some further reduction is shown in the estimated costs of scientists and lecturers because of the expected shortage of funds in 1969. As a result of the Centre's move from the centre of Trieste to Miramare in April/May 1968 some increase in common services and supplies is expected; based on experience in 1967, an additional $39 000 is estimated to be needed for this purpose in 1969. All other changes are minor and are based on recent experience and price and salary changes.

318. The breakdown of salaries and wages costs in accordance with the form used in Table 50 of the Regular Budget for other Agency staff is given in the table below.

Table 19

1967	1968	1969	Position	1967 $	1968 $	1969 $
1	1	1	P-5 Senior Officer	13 110	13 110	13 110
1	1	1	P-4 First Officer	10 730	10 730	10 730
1	1	1	P-3 Second Officer	8 889	8 889	8 889
1	1	1	P-2 Associate Officer	7 287	7 287	7 287
4	4	4	Sub-total	40 016	40 016	40 016
12	12	12	General Service staff	36 000	37 200	38 900
5	5	5	Maintenance and Operatives Service staff	6 000	6 000	6 500
21	21	21	TOTAL	82 016	83 216	85 416
			Salary increments	2 185	2 284	2 584
			Sub-total, established posts	84 201	85 500	88 000
			Add: Overtime	2 222	1 300	-
			Other staff	24 814	24 200	25 000
			Sub-total	27 036	25 500	25 000
TOTAL, Salaries and wages				111 237	111 000	113 000

319. The provision for "Other staff" covers the emoluments of the Director of the Centre and partial payment of local staff, who are furnished by the local authorities on a different work-week basis and must be paid extra to be available for the Centre's normal work-week.

7. NUCLEAR POWER AND REACTORS

Summary of costs

Table 20

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	291 228	329 000	18 200	347 200	39 300	386 500
Common staff costs	110 906	122 500	7 300	129 800	13 500	143 300
Panels and committees	25 486	24 000	8 500	32 500	(6 500)	26 000
Seminars, symposia and conferences	21 854	39 000	(11 500)	27 500	-	27 500
Scientific and technical services	101 340	110 000	14 000	124 000	7 000	131 000
Duty travel and missions	25 336	31 000	(5 000)	26 000	-	26 000
Representation and hospitality	1 300	1 500	-	1 500	-	1 500
TOTAL	577 450	657 000	31 500 4.79%	688 500	53 300 7.74%	741 800

Programme

Highlights

320. This part of the programme presents the work of the Division of Nuclear Power and Reactors in the Department of Technical Operations. The programme is carried out by four sections, which are responsible for reactor engineering, economic studies, nuclear materials and fuel cycles, and reactor physics and research reactors. The Division provides advice and assistance to Member States concerning their reactor programmes or projects; evaluates the technical feasibility, design, technology and economics of various reactor systems, as well as operational experience therewith and its application to meet given needs; studies the supply and processing of nuclear fuels through all stages and encourages development of new sources of fuel and more economic processes, and assists Member States in the utilization of their research reactors.

321. The provision of expert advice and the distribution of information is effected by means of regional study groups, panels, symposia, monographs, advisory service missions, short-term experts, and research contracts. During the next few years increasing attention will be given to the use of low-cost nuclear power for desalting water and for agro-industrial complexes based on nuclear plants.

322. The expected increase in costs in 1969 is due to some increased emphasis on research contracts and the addition of one P-2 and one GS post. The preliminary estimate for 1970 assumes a further increase of three Professional posts, one for a specialist in the peaceful uses of nuclear explosives, one for a chemical engineer and one for a junior officer, and two GS posts.

Power reactors

323. This part of the Agency's programme is concerned with nuclear power reactor systems as a source of energy for the production of electricity, water, and for other industrial purposes, problems of reactor engineering and technology, and world-wide information on the technical characteristics of nuclear facilities. The Agency has another role in encouraging the avoidance of unnecessary duplication of efforts and speeding development of reactor systems through international collaborative programmes and joint projects among Member States.

324. With regard to established power reactor systems, emphasis will be placed on gathering and evaluating operating experience, following improvements in designs, and adaptation and use of these systems in small and medium sizes in developing countries. With regard to advanced converters, emphasis will be placed on following the development of heavy-water reactors, high-temperature gas-cooled systems, molten-salt reactors and other promising concepts.

325. The fast reactor system will be of increasing importance. Efforts will be made to develop the working group concerned into a co-ordinating group for research and development programmes.

326. Of basic importance in the development of nuclear power is the transition from the current thermal reactors to breeder reactors. A comprehensive assessment of the many factors involved, such as the world resources of uranium and thorium, the characteristics and economic potential of all the relevant reactor systems, the requirements for fuel and for enrichment, fuel fabrication and reprocessing capacities to meet assumed installation programmes, and problems of plutonium and thorium utilization, is essential. The Agency's meetings and other activities serve among other purposes to co-ordinate information on the characteristics and potential of various reactor types.

327. Concerning the question of future requirements for fuel and for enrichment, fuel fabrication and reprocessing capacities, a preliminary internal study of the problems involved is proposed. This would be followed by the award of suitable research contracts in 1969 and later, by forecasts made within the Agency - probably involving computer calculations - of the requirements based on a range of assumptions and possible installation programmes. The results would be reviewed at intervals. Suitable publications will be issued for the information of Member States.

Thorium and plutonium utilization

328. The work on thorium utilization involves the study of reactor concepts involving the use of thorium, and associated reactor physics, engineering and fuel fabrication and reprocessing technologies. Several systems designed to use the thorium/uranium-233 cycle are under development or at the prototype stage, including the high-temperature gas-cooled reactor, the molten-salt reactor, the seed-and-blanket reactor and the aqueous homogeneous suspension reactor.

329. The Agency has a continuing programme dealing with the various aspects of thorium utilization. A panel in 1965 established a Working Group on Thorium Utilization which held its first meeting in 1966. Another panel meeting is scheduled for 1968 and biennial meetings of the Working Group are envisaged. The subject is of special interest to some developing countries with large thorium resources.

330. The accumulation of large quantities of plutonium from the operation of thermal power reactors is a matter of great economic concern. The question is whether to recycle this plutonium in the next generation of thermal reactors or to keep it for use in industrial fast breeder reactors if these should come into operation soon. The answer depends on the successful development of the technology of recycling and its economics, and the pace of development of fast breeders. Since technologies are progressing rapidly it is necessary

to review the situation every two or three years in a technical panel, as part of a larger symposium, or through contracts and internal studies.

331. A panel meeting on this topic is scheduled for 1968. Another is proposed for 1970. In 1973 or 1974, the programmes may have progressed to the point where a symposium would be appropriate.

Reactor systems

332. To follow closely the progress in the evolution of various reactor systems and associated technologies, the programme includes a series of meetings which serve to provide a forum for the international exchange of information among experts and to facilitate the co-ordination of data important for long-term planning.

333. Light-water reactors are expected to receive the biggest boost in installed capacity between 1969 and 1974 and to benefit most from mass manufacture and standardization of components and fuel elements. Particular attention will be paid to the operating experience with such reactors, and evaluations of the improvements and modifications of the designs will be carried out for the benefit of Member States contemplating their use.

334. Natural uranium, graphite-moderated, gas-cooled reactors now have an established place in the nuclear power programmes of some Member States and some important developments, such as the use of annular fuel elements, are still in progress. Power stations using advanced gas-cooled reactors will come into operation from 1970 onwards. Prototype high-temperature gas-cooled reactors are already in operation and have produced satisfactory and encouraging results. Such reactors, using prismatic fuel elements or the pebble-bed design appear to show considerable promise as advanced converters on either a thorium/uranium-233 cycle or a slightly-enriched uranium/plutonium cycle. It seems possible that later advanced gas-cooled reactors may employ some of the technology used with high-temperature gas-cooled reactors, in particular coated particles. Prototypes of heavy-water moderated, gas-cooled reactors are in operation or under construction in several Member States. A symposium on advanced and high-temperature gas-cooled reactors in 1968 is one of a series of meetings on reactor types at which technology and experience will be reviewed in detail and future developments discussed.

335. Heavy-water reactors, including experimental reactors, prototypes, and first-generation plants, have been successfully operated in a number of countries. Since heavy-water reactors have excellent conversion characteristics, they could save significant amounts of natural uranium in the pre-breeder phase and permit expenditure on new diffusion plants to be postponed or reduced, provided that they are accepted as producers of the plutonium needed for fast breeder reactors. It will take some years to determine the types of different construction and varying coolant and coolant circulation patterns that will prove most economic. The immediate intention is therefore to study the development of these variants and encourage international co-operation leading towards concentration of efforts on fewer variants.

336. In regard to fast reactors, the Agency's programme is expected to be more extensive than formerly because very large efforts and resources have been committed to their early development in several Member States. Activities must increase, especially after 1969-1970, when two prototypes, in the Soviet Union and the United Kingdom, are scheduled to become critical, and prototypes in some other advanced countries are likely to be under construction. In addition, different fast critical facilities, sodium rigs, and component mock-ups will provide a great deal of information on various physical and technological aspects of fast breeders.

337. In order to facilitate prompt exchange of information in this area, and help to co-ordinate technical meetings, the Working Group on Fast Reactors will meet at least once a year. In addition, one specialists' meeting per year within the purview of the Working Group, is contemplated. Possible topics to be reviewed will include: sodium water reaction;

compatibility of materials with sodium; detection of fuel canning failures; experimental results with regard to fuel irradiation; handling and transport of highly irradiated fuel elements. During 1969-1970 at least two publications are expected to result from these activities.

338. The programme for 1971-1974 will be elaborated in detail in consultation with the Working Group, taking into account the results of research and development operating experience gained with prototypes. Some topics which may call for technical meetings are:

(a) Operating experience with fast breeder reactors;

(b) Design criteria and main features of industrial fast breeder reactors;

(c) Sodium technology for fast breeder reactors; and

(d) Heat exchangers for fast breeder reactors.

339. Among advanced power reactors, competitiveness with fossil-fuelled plants has been achieved by some systems, but there remain the problems of still lower generation costs and better utilization of fuel resources. While the fast breeder reactor seems to have the best prospects of achieving these objectives, there are other reactor systems under active development which might play a role as advanced converters or thermal breeders, such as the molten-salt reactor, which has completed over 6000 hours of satisfactory full power operation, the aqueous homogeneous suspension reactor, which is expected to begin operation in 1968, and the ultra-high-temperature reactor, with the ultra-high-temperature reactor experiment nearing completion.

340. In 1969, it is planned to organize a symposium on fast breeder reactor technology, the specific topic to be determined in accordance with the recommendations of the Working Group on Fast Reactors.

341. For 1972, a symposium on gas-cooled reactors is foreseen, and during 1973-1974 the following subjects are likely to be dealt with at Agency-sponsored symposia:

(a) Heavy-water reactors (1973);

(b) Fast breeder reactors (1973); and

(c) Advanced power reactors (1974).

342. An increasing number of requests for the Agency's advice and services may be expected during 1969-1971, and it is expected that, on the average, two Member States per year may ask for missions to assess general or specific problems in planning nuclear power programmes; such power survey missions usually consist of economists, power system engineers, power reactor systems engineers and specialist consultants from other organizations in the United Nations family, as appropriate. In addition, there will be a need for two missions per year to provide technical advice in the evaluation of reactor systems and proposals for particular projects.

343. Following the international survey course on the technical and economic aspects of nuclear power held in 1966, a similar course is planned for 1969, subject to the availability of funds; it may be desirable to schedule a third such course in 1972. More use will be made of regional study group meetings to discuss the problems and prospects of introducing nuclear power in developing countries. One such meeting per year is planned from 1970 through 1974, each in a different region.

Small- and medium-power reactors

344. Nuclear power has not yet had any appreciable impact on developing countries, where the need for low-cost energy is really urgent. There are several reasons for this, the most important being that the cost of generating electricity falls more rapidly with increasing unit size in the case of a nuclear plant than in that of a fossil-fuelled plant. Very large units, however, though very economical, cannot find many applications in developing countries where the grids are still small. Given adequate development effort and a reasonably large market, nuclear plants in the 50-300 MW(e) range might also prove economic under the conditions prevailing in some of the developing countries. However, comparatively limited effort has been devoted to such plants because they are not of immediate interest to industry in highly advanced countries, which already has a considerable number of orders for large sizes.

345. One of the ways to speed up the introduction of nuclear power in developing countries is to promote the development of suitable small- and medium-sized reactors which can find economic application in certain environments. The problems to be overcome are very difficult. However, it is planned to undertake a systematic programme of study and analysis of all aspects of small- and medium-size power reactors to establish whether they offer potential economic applications in developing countries and the best way to promote their development; the feasibility of international collaboration among developing countries and with industrialized countries is also to be examined. A panel in mid-1968 is expected to help in spelling out a detailed programme for 1969-1970 and 1971-1974.

346. If warranted, a working group will be established to co-ordinate and stimulate this work. Suitable research contracts will be placed to develop new ideas for designs, improvements and simplifications, and investigate how local industries in developing countries could participate more effectively in nuclear power projects.

347. Co-operation will be sought from United Nations organizations, especially UNIDO, ECLA, ECAFE and ECA, in order to study potential requirements and markets for plants in developing countries.

348. A symposium on small- and medium-power reactors is planned for 1970. This will concentrate on the state of technology of various reactor systems particularly suitable for small- and medium-power plants, simplification in design, cost reduction possibilities, the contribution by local industries in manufacturing and building these plants, fuel cycles and operation and maintenance.

Mobile reactors, including propulsion systems

349. A symposium proposed for 1970 will deal primarily with nuclear ship propulsion. Several Member States have nuclear ships in operation or under construction. By 1970, the experience gained from such ships as the Lenin (USSR), Savannah (USA) and Otto Hahn (Federal Republic of Germany), together with information on the design and construction of other ships, will be available for review. Advanced designs for ships such as submerged tankers could also be of great interest.

350. Other topics for discussion would be nuclear propulsion for space vehicles and mobile reactors carried by land vehicles or special ships; the latter could be of particular value as a temporary source of power and water supply to localities undergoing development.

351. At present the future of nuclear ship propulsion is not clear and a number of problems remains to be resolved. The Agency will continue to watch all developments, particularly with regard to the special design features of nuclear ship reactors, their engineering and construction problems, economics and safety.

Experience with nuclear power plants

352. A large number of second- and third-generation power reactors is expected to be commissioned during the early 1970's, raising the installed nuclear capacity from 23 000 MW in 1968 to 90 000 MW in 1974. This remarkable and rapid expansion may be attended by some teething troubles, especially with large-sized plants currently under construction. The Agency plans to undertake the collection, compilation and analysis of available data on the operation of nuclear power plants, covering such items as overall plant availability, component reliability, operating characteristics, modifications required for improvement in performance, maintenance, operators' training, operational safety, fuel management, programme and costs. A reference to some of these items has already been made in the paragraphs dealing with reactor systems and components.

353. The distribution of reports on the experience gained with nuclear power plants initiated in 1960 will be continued and expanded. Data will be collected on as wide a basis as possible with the co-operation of Member States. Since the collection and analysis of this information is of particular interest to developing countries, it may be possible to use some nuclear power plant specialists from these countries who may wish to come to the Agency as junior trainees.

354. A symposium on operating experience with nuclear power plants is planned for 1972, and this will provide a timely opportunity for a review of information on a world-wide basis.

Reactor and system engineering

355. Agency activities include the handling of requests and provision of advice on the technical evaluation of proposals for nuclear plants in the light of local conditions and circumstances, the conducting of basic engineering cost studies relating to the construction and maintenance of nuclear power plants, which are supplementary to economic studies, the provision of technical advice on the behaviour of various reactor components and systems under normal and abnormal conditions, and on the margins of safety incorporated in their design, and the co-ordination and encouragement of the development and standardization of certain key components.

Heat transfer and fluid flow

356. The perfection of core design, safety and improvements in nuclear systems depend upon the satisfactory solution of various heat transfer and fluid flow problems covering burn-out flux, hot spot and hot channel factors, two-phase flow, dynamic stability behaviour under transient conditions and so on. Research in heat transfer will continue to be encouraged because of the need for developing better data and correlations. A publication in the review series giving a comprehensive compilation of basic heat transfer data for reactor design is planned for 1971-1972.

357. A symposium is planned in 1970 on advances in heat transfer and fluid flow in light- and heavy-water reactors; it will cover such topics as burn-out margins, flow stability, slip and friction in two-phase flow, new design of heat transfer surfaces and new correlations. A similar meeting on heat transfer in gas-cooled reactor systems is envisaged for 1972. During 1973-1974 it is proposed to organize a symposium on heat transfer in liquid-metal cooled systems with emphasis on sodium.

358. Attention will also be devoted to heat transfer problems in flash distillation desalters. For maximum exploitation of relatively high-temperature steam from nuclear reactors, the operating temperature of desalters should be raised, which introduces additional problems in heat transfer and choice of materials. It will be necessary to follow the developments in desalter technology in this regard.

Reactor control and instrumentation

359. As nuclear plants grow larger and more complex, the need for their automatic control increases, both from the point of view of efficiency and economy of operation and safety. The use of on-line computers in monitoring and operating plants is becoming more common, facilitated in part by recent developments of in-core instrumentation and miniaturized sensors and detectors which can monitor critical parameters of the reactors and permit the operation of the reactor closer to the design limits of critical parts. Further advances are expected in the field of reactor control and instrumentation and it is essential to follow them closely. Control philosophies are also undergoing evolution, and their influence on the design of control systems and ultimate safety deserves to be studied. All these matters will receive due attention.

360. During 1971-1972 a symposium on the control philosophies and engineering of reactor plants is envisaged. The advances in reactor instrumentation, especially in-core and miniaturized instruments, and experience gained in their use in reactor environments may call for a symposium on this subject in 1973-1974.

Components

361. The progress of a reactor concept from the experimental to the industrial stage involves the development and manufacture of all types of components, the performance, reliability and cost of which hold the key to the economic application of nuclear power. As nuclear systems are competing against conventional plants and one reactor system against another, the need for suitable and reasonably priced components becomes greater. In the long run, the performance of a reactor system is judged by the performance of its individual components.

362. The programme will focus attention on the key components of reactor plants - pressure vessels, heat exchangers, fuel assemblies, refuelling machines, control rod drives and and devices, pumps and circulators, and valves - through continuing reviews, exchange of information and appraisals of performance, design improvements and costs. To the extent possible, the standardization of components and the use of modules to build reactors of varying capacities should be encouraged so as to achieve economies. Developing countries will be offered advice and assistance with regard to the possibility of designing and manufacturing components locally.

363. In 1969 a symposium will be held on the performance of nuclear power reactor components. The information on component reliability is often fragmentary, as it is usually presented as subordinate material to papers on operating experience; by 1969, there should be considerable operating experience to be presented in a more organized fashion.

364. Since 1966, the Agency has had a continuing programme on steel pressure vessels. A working group of specialists has dealt with various aspects of steel pressure vessels including the processes of inspection, and in 1967 it recommended that it would be useful and advisable if the Agency developed a continuous programme in neutron irradiation embrittlement of reactor pressure vessel steels. Another meeting of this working group in 1969 will deal with:

(a) The relation of variation in irradiation damage for a particular type of steel to production and specification variables, and

(b) The possibilities of developing pressure vessel steels of higher strength and lower and more consistent irradiation sensitivity.

365. During 1969-1970, several publications and technical reports will be prepared either internally or with the help of outside specialists; they will cover such titles as "Periodic Inspection of Reactor Steel Pressure Vessels", "Possibility of Using the Electroslag Welding Method for Reactor Steel Pressure Vessels", and "Review of Welding Techniques in Industry".

366. The evolution of large-capacity water-cooled reactor systems may provide opportunities for using pre-stressed concrete for pressure vessels, which may enhance the safety of power reactors and permit their location closer to populated areas and cities. It is known that many countries have started studies and research work on pre-stressed concrete reactor pressure vessels. The construction of these pressure vessels will influence the overall design of the reactors and their ultimate safety. A review publication and a panel on pre-stressed concrete pressure vessels are planned for 1970.

367. During the period 1971-1974 reactor components will merit even greater consideration in the programme, particularly:

(a) Reactor containment designs and structures;

(b) Saturated steam turbines;

(c) High-temperature gas turbines;

(d) Pumps and circulators; and

(e) Control mechanisms.

368. One symposium and two panels on special reactor components are envisaged for the period 1971-1974 to exchange experience and review the latest developments and design improvements.

Technical information on reactors and nuclear facilities

369. The Agency will continue to issue technical directories and reports on basic data and characteristics of nuclear reactors and associated nuclear facilities, and summaries of the nuclear power programmes in Member States. By the beginning of 1969 seven volumes of the Directory of Nuclear Reactors - a publication which has been found to be a very valuable source of reference - will have been issued.

370. With the rapid increase in the number of nuclear reactors and related facilities, The Agency's computer is being utilized for the storage of detailed information on reactor design and performance characteristics; furthermore, it is intended to collect pertinent information on other nuclear facilities and to publish statistical reviews at regular intervals. To assist in the collection of technical data on reactors and related nuclear facilities, a new system has been set up by which national correspondents nominated by their respective countries will contribute to the Agency's system. In 1969 it is proposed to hold a panel of these national correspondents to advise on:

(a) The best ways to collect information on reactors and other facilities; and

(b) The most suitable retrieval schemes the Agency could employ with the centralized data.

In particular, the panel should discuss the specific needs felt in Member States for information and the best way of presenting this information.

371. For the period 1970-1974 it is expected that on the recommendations of the panel, a working group may be formed to review technical information activities. In particular it may advise the Agency on the nature and form of statistical data to be produced.

372. The following publications and information services are envisaged:

(a) Directories of nuclear reactors and related facilities;

(b) Annual reports listing facilities in the Agency's Member States and giving global statistical data; and

(c) Computer print-outs from the files, on request.

Economic studies

373. All activities related to power reactors, nuclear fuels, desalting and energy centres have major economic aspects; waste disposal, safeguards and the industrial applications of isotopes also have cost implications for the assessment and analysis of which reasonably uniform procedures would be useful. Economic activities are therefore, more than any others, closely interwoven with those of other groups and cannot be enumerated fully without repetition of other parts of the programme. They can be divided into three main categories:

(a) Collection of data, evaluation and forecasting;

(b) Economic methods and analyses; and

(c) Advisory functions.

374. The maintainance of an up-to-date world-wide picture of the economic prospects for nuclear energy requires a continuous analysis of factors determining present and future demand and supply. The following activities will, therefore, remain essential:

(a) Continuous analysis of energy and power developments in Member States and main geographical regions of the world;

(b) Evaluation and forecasts of nuclear energy costs; and

(c) Continuous survey of conventional energy costs.

375. To establish continuous coverage of present and future energy demands, to estimate the share of nuclear power in meeting them and to help Member States to plan for the introduction of nuclear power, national and regional energy requirements must be closely watched. The role of the Agency will not be limited to recording national or regional forecasts but will extend to analyses of developments which may change present projections. The main burden of this continuous undertaking will be carried by the Agency, which will endeavour to establish a comprehensive and current survey system and release relevant information. Storage and retrieval of data in and from a computer is likely to prove essential. Co-operation with regional and national organizations and with Regional Commissions of the United Nations will be important.

376. Regional study groups on nuclear power, which have yielded such useful information in the past, will have to be continued. One meeting will be required in 1970. Two groups at least have to be provided for in the period 1971-1974.

377. The evaluation of nuclear energy costs involves both a critical analysis of published capital cost data and forecasts of possible costs for advanced nuclear power plants and multi-purpose installations. With regard to fuel costs, it requires a continuous survey of resources of nuclear fuel, economic analyses of all steps of the fuel cycle - fabrication, enrichment, reprocessing, recycling of plutonium - and studies of the relative values of different fuels in different reactor types. Only the tasks in which the economic aspects are predominant are mentioned here. The Agency will maintain a continuous survey of cost developments and make summary surveys available to Member States.

378. A symposium on nuclear energy costs and economic development is proposed for 1969; it will cover the following topics:

(a) Prospects of future decreases in nuclear energy costs;

(b) Prospects of large multi-purpose, energy-intensive installations such as desalting plants and energy centres;

(c) Influence of low-cost energy and power on the use of energy-intensive processes in industry; and

(d) Significance of these factors for the economic progress of developing countries.

379. For 1971-1974 a symposium on capital cost experience for proven reactor types is envisaged. It is foreseen that a number of meetings, the nature of which can only be determined in the light of future developments and of internal studies in the Secretariat, will be devoted to the economics of the different aspects of the nuclear fuel cycle, such as ore reserves in different cost ranges, fabrication, enrichment, reprocessing and the relative values of different nuclear fuels in a multifuel economy.

380. For the comparison of nuclear energy with its competitors general surveys of technical and cost developments for conventional power plants and fossil fuels are essential. For this purpose, the Agency will maintain close liaison with specialized national and international organizations and prepare periodical surveys. Consultant services may be required to assist in the assessment of the economic significance of major new developments in the reserve estimates and in the technology of oil, gas and coal.

381. In regard to economic methods and analyses the role of the Agency is twofold. It must serve as a clearing-house for economic information presented by Member States on the basis of their own cost accounting procedures, which are often very different in approach and sometimes seriously misunderstood. The Agency should carry out interpretative studies of the costing methods at present used in different groups of countries, and must attempt to achieve some degree of unification in the methods used for cost appraisals. This work will have to be done with the assistance of consultants and possibly through service or research contracts.

382. There are, however, larger aspects of the problem which are best dealt with through meetings. Therefore, a symposium on the economic integration of nuclear power stations in electric power systems is proposed for 1970 to deal with problems in the economic planning of the expansion and operation of electric power systems, with special emphasis on questions arising from the increasing proportion of nuclear power plants in those systems.

383. In the period 1971-1974, a symposium on the economics of nuclear power programmes, including supporting industries, is planned, and a panel discussion on the costing of multi-product installations, such as energy centres, as a logical follow-up of the panel on costing procedures for desalting, is foreseen.

384. The scope of advisory services is likely to expand rapidly. Within the Agency, close co-ordination will have to be established in the approach to all problems with a predominant economic content. The general power missions of the past are likely to be progressively supplanted, with even more numerous missions providing specific assistance, such as evaluation of bids and guidance in securing international financing.

385. The implementation of these activities will probably require very flexible arrangements. Panels of experts will be necessary for bid evaluation, the Agency acting essentially as a co-ordinator. Advice on international financing will require contact with international and national financial organizations and in particular with IBRD. The steps taken in 1967 to

establish a liaison with the Bank must be followed up by systematic visits and exchange of information.

386. For 1969 and 1970, four nuclear power and desalting missions can be expected to visit Latin America and the Far East. Two ad hoc meetings on specific assistance in the preparation of invitations to bid or in bid evaluation are contemplated. During 1971-1974 two missions and one meeting annually must be foreseen.

Nuclear desalting and other applications

387. With the availability of competitive and low-cost heat from present-day and future nuclear reactors the use of nuclear energy for desalting will increase and be followed by the development of the concept of energy centres. Nuclear desalting is developing rapidly both in its technical and economic aspects. In the early 1970's it is likely to become economically competitive with municipal and industrial conventional water projects in areas where indigenous supplies are limited and the cost of water transportation is high. The construction of nuclear desalting facilities may well result in a decrease of their unit cost and increase their potential applicability in developing countries.

388. Data on which cost estimates and appropriate performance guarantees of large-capacity desalting plants could be based should be available within three to four years from programmes planned and under way in Member States. A dramatic rise in the installed desalting capacity should be experienced in the early or mid-1970's. It is possible that some of the plans will be for regional plants involving more than one Member State, in which the Agency can play a very useful co-ordinating role. Many of these will not only produce power and desalted water, but will manufacture chemicals and fertilizers and supply power for support industries.

389. The part played by the Agency in this programme arises from the conviction that nuclear desalting can be one of the most important contributions to economic development. A concentration of efforts is therefore necessary. The programme envisages that the Agency would serve as a focal point in matters relating to the use of nuclear energy for desalting and its allied applications in chemical and fertilizer manufacture, and that it would provide assistance and advice to Member States through comprehensive case and pre-investment studies by sending missions and co-ordinating joint studies for two or more Member States.

390. In the period 1969-1974, the Agency's principal aim will be to assist requesting countries in promoting the development of nuclear desalting by:

(a) Assessing the role which nuclear energy can play in satisfying water and chemical requirements;

(b) Organizing and extending training in nuclear desalting engineering;

(c) Furnishing Member States with systematic scientific and technical information on problems connected with nuclear desalting engineering; and

(d) Finding methods for the optimum development of nuclear desalting in the existing circumstances.

391. Having been actively involved in several nuclear desalting studies, the Agency expects to be involved in additional studies and, possibly during the latter part of the period 1971-1974, in pre-investment studies of nuclear desalters, more heavily than in the past. Some more complex studies may involve the recovery of chemicals from brine and the production of fertilizers and chemicals, utilizing a common reactor facility, and these will require arrangements for greater co-ordination with other organizations and between

Member States. Enormous quantities of sea water will be used by these nuclear desalting centres, and most of the heat generated will be discharged back into the ocean in the form of warmed sea water and brine. Proper use of the warmed sea water and intensive effort on an international scale could further promote the development of large coastal areas.

392. Within the programme of research contracts on power reactors and their applications, strong emphasis will be placed on the development of new information on improved reactor designs for desalting and on the coupling of power reactors with desalting processes and chemical manufacture; one contract per year will be required.

393. A most important activity of the programme will be the maintenance of direct contact between Agency staff and appropriate scientists and engineers in Member States; it is expected that three to five countries should be visited annually to provide advisory services on nuclear desalting programmes. As a result, six to eight nuclear power desalting missions will be required during the 1969-1974 period, most of them during the latter half of the six-year period.

394. A joint IAEA-Mexico-USA Study Group has conducted a comprehensive preliminary study on the feasibility of installing dual-purpose nuclear power and desalting plants to provide desalted water and power to cover estimated needs through 1995 to adjoining regions of the States of Sonora and Baja California in Mexico, and Arizona and California in the United States of America, and a report on the first phase thereof is expected in 1968. Depending on the decision of the Governments concerned, this study may be expanded into a detailed engineering study, and it is possible that the Agency will be involved in this during the 1969-1974 period. The Agency has also participated in joint studies on nuclear desalting with the United States and Israel and with the United States and the United Arab Republic. Either or both may lead to projects for which the Agency could provide co-ordinating services.

395. By 1971-1972, a seminar should be held to provide proper orientation to senior officers from the several Member States involved in nuclear water and power programmes; it would stimulate interest in nuclear desalting and would supplement training of younger engineers. In addition to the proceedings of symposia, and possibly panels, three monographs on selected topics of nuclear desalting, prepared by consultants, may be published.

396. For 1969 a panel on technical progress and economic aspects of desalting and energy centres is proposed, to review current technology and trends and to make recommendations concerning the course of the Agency's programme. For 1969 a regional study group meeting on nuclear desalting is also proposed, to consider regional problems, possibly jointly with FAO and the appropriate United Nations regional economic commission.

397. Indications are that two or three panels will be needed during the period 1971-1974 to discuss specific aspects of multi-purpose nuclear desalting centres; likely subjects include a case study of a nuclear desalting facility, coupling of large nuclear power and desalting plants, effluent studies including brine utilization and disposal, environmental studies and use of desalted water in agriculture.

398. An international symposium on nuclear desalting applications is proposed for 1973-1974 to review the experience of plants in operation and to examine the technical and economic aspects of multi-purpose nuclear power and desalting centres.

399. The concept of energy centres is a logical extension of the use of nuclear energy for electricity production and water desalting, and represents the culmination of efforts to exploit this source of energy to the fullest, involving the broadening of nuclear energy applications to cover energy-consuming processes and industries. It visualizes the production of very cheap energy by large nuclear reactor centres around which are clustered numerous industries such as power, desalting, fertilizer production, food processing, metallurgical and manufacturing industries. Its implementation will require very large investments and considerable time, but it is both inspiring and soundly based

technologically. It can accelerate the development of many countries and transform the economic situation in others.

400. The Agency plans to pursue this concept. A team of experts, assembled at Oak Ridge National Laboratory in the United States, has studied the technical and economic feasibility of the energy centre concept; their report is expected to be finished during 1968 and should provide good basic information for future studies by other groups. By the end of 1970, one or two specific energy centre studies will probably be in progress, and perhaps a number of new sites will be proposed for study; the Agency expects that energy centre studies will become a regular part of the 1970-1974 programme.

401. The type of activity envisaged for the period 1970-1974 includes:

(a) At least one energy centre study of a specific site a year. Site selection studies will be associated with these studies; and

(b) Publication of reports and computer programmes on methodology.

In this work the Agency will call upon expertise from inside and outside the Secretariat; some of the contributing disciplines will be chemical and industrial engineering, demography, sociology, urban planning, and international financing. As in the case of nuclear desalting, co-operation with FAO will be ensured through the Joint FAO/IAEA Division; joint sponsorship of some parts of the programme with UNIDO is also contemplated, and consultation with international banking organizations, particularly IBRD, is envisaged. It is proposed to set up regional "practice courses" or task forces to study prospects of energy centres in various regions. In co-operation with ECAFE one such course is planned for the Far East and South Asia in 1970; a similar course is planned for Latin America in 1971 in collaboration with ECLA and other organizations.

402. The design of very large reactors with integrated fuel fabrication and reprocessing facilities which would be appropriate for energy centres raises special problems. Although the reactors would be of a well-established basic design, some aspects of the reactor design and of the fuel cycle may well differ if the maximum economic benefit is to be obtained; a symposium on this topic is proposed for 1971-1972.

403. Possible topics for additional symposia, panels and working groups to be organized during 1971-1974 are:

(a) Power reactors for specific industrial complexes;

(b) Energy centres for urban complexes;

(c) Cost and financing of energy centres;

(d) Status reports on specific studies for energy centres;

(e) Food factories based upon low-cost energy; and

(f) Ship-transportable energy centre (as a first step in opening new areas for development).

404. Aware of the potential economic benefits which may accrue from the peaceful uses of nuclear explosives, the Agency plans to initiate appropriate studies on the technical, economic and health and safety aspects of such uses. If appropriate international agreements are reached, many new experiments and projects based on the use of nuclear explosives may be proposed for digging navigation canals, making harbours, blasting tunnels, and facilitating recovery of oil and gas and important minerals from underground reserves. The Agency expects to participate in some of these studies and evaluations during the 1970-1974 period. It will consider organizing panels to review available

information on technical, engineering, economic and safety aspects and to develop its programme. Proposed topics cover:

(a) Status reports of national programmes;

(b) Interpretation of data for experiments to develop scaling laws;

(c) Planning and conducting of projects;

(d) Health, safety and decontamination problems of such projects; and

(e) Engineering methods and economics.

405. Of other advanced applications, the prospects of nuclear ship propulsion have already been discussed above; clearly, as and when the prospect of this application becomes more promising, supporting activities in economics and in planning will be needed. Ultimately, it is hoped that international co-operation on the subject of nuclear reactors in space will make them, also, an appropriate subject for Agency activity.

Nuclear materials and fuel cycle

406. The re-establishment of the Fuel Cycle and Nuclear Materials Section in the Division of Nuclear Power and Reactors illustrates the Agency's awareness of the growing importance of the extraction of nuclear materials from ores and of the fabrication and reprocessing of fissionable material. In general, it can be stated that the activities described below will be expanded during 1971-1974 along the lines indicated. Those activities are: mining, concentration and processing of uranium and thorium from ores and raw materials; preparation of nuclear fuel materials, their fabrication into reactor fuel elements, and a study of their behaviour during reactor irradiation; and the reprocessing and recycling of the fuel material after irradiation.

407. A number of important problems relating to methods of processing low-grade ores may be solved in the near future. The Agency will closely follow the progress made and stimulate work relating to such methods, because the supply of inexpensive fuels could be greatly increased by favourable developments. Special emphasis will be given to maintaining a continuous survey of nuclear ore reserves and to developing more economic techniques. Accordingly, the following activities are proposed for 1969-1970:

(a) A research programme on recovery of uranium as a by-product of fertilizer production from phosphate rocks, and from other promising minerals which are processed in bulk;

(b) Two panels (in 1970) to complement this research programme; one of these will cover processing of low-grade ores, emphasizing problems relating to the solubilization of uranium from ores and the recovery of uranium from solution and slurries; the other will deal with new solvents for extraction processes; TBP is widely used as a solvent at present but has unstable physical properties, and consequently the physical and chemical properties of some new solvents such as long chain amines, organic solvents, TBP and amine mixture, etc., should be examined;

(c) In the field of mining, engineering and geology:

(i) The collection of data on world reserves and resources which are made more accurate by encouraging the development of a uniform estimating and reporting system, and the provision of assistance to developing countries in exploration projects;

(ii) The cataloguing of information according to location, characteristics, etc.;

(iii) The development of world resources estimates by continuing co-operation with ENEA;

(iv) The provision of a clearing-house for information; and

(v) The sponsoring of research; and

(d) It is proposed to hold a symposium on heavy-water production. The topics would include research on new methods, operating experience of existing plants, costs, energy requirements, reactor and other uses of heavy water, and combined systems incorporating heavy-water production plants in industrial complexes. The published proceedings of the symposium would supply up-to-date information which would be useful to those planning heavy-water production facilities and plants which use heavy water.

408. A number of different materials (ceramic, cermet, alloys) allow a higher burn-up at a higher operational temperature; this is of great importance for advanced converters and fast breeder reactors likely to be constructed in the 1970's to 1980's. Development of new fabrication methods allowing for automation and remote control must be encouraged, for it is likely that highly radioactive materials will have to be processed as recycling of fuels becomes more common. At the same time, methods permitting the economies resulting from mass production and on-line inspection to be effected should be pursued.

409. The performance of a reactor system is determined largely by the behaviour of the fuel element. The establishment of design criteria based on thermal, hydraulic, structural, materials and engineering considerations represents a large part of the total effort required to develop a reactor system, and standardization of the basic parts of a fuel assembly and structure could lead to significant savings. Developments in fuel element design and possible ways of improving their performance and reducing costs will be the subjects of continuing study.

410. Finally, evaluation of irradiation behaviour of fuel elements and materials during burn-up is a basic requirement of nuclear fuel technology, and the following activities are proposed in this respect:

(a) A symposium on improved and advanced techniques for fuel fabrication to be held in 1970; fuel fabrication techniques are developing very rapidly and processes which are considered unusual may be the most economic in the long run and should therefore be presented; where possible, they should be evaluated through experimental irradiations;

(b) A panel on non-metallic fuels to be convened in 1970 to consider new materials, methods for their fabrication and equipment for their processing; what is contemplated is a review of the entire fuel cycle for these materials;

(c) A group of experts which might be convened in 1969-1970 to review the technical feasibility of developing simpler fuel elements which could be manufactured locally in less industrialized countries; and

(d) Two technical meetings, for the most part information meetings on fuel elements for power reactors, which it would be desirable to convene during 1971-1974 to deal with such topics as:

(i) Thermal, hydraulic and mechanical aspects of the design of fuel assemblies; and

(ii) Behaviour of power reactor fuel elements under operating conditions (radiation effects, mechanical integrity, corrosion, etc.).

411. The reprocessing of highly radioactive fuels is a most important problem. Research should be carried out on non-aqueous methods and on adaptations of aqueous methods. Non-aqueous reprocessing, particularly by fluoride volatility processes, is very promising. However, many problems must be solved before it can be applied on a commercial scale. Following some promising new results in the adaptation of solvent extraction processes it seems that for 10-15 years to come aqueous methods will be used for reprocessing highly radioactive fuels. The problem of reprocessing highly radioactive fuels is very important, not only for the fast reactor fuel cycle, but also for the thermal reactor, because of the promising developments towards a higher burn-up and a shorter cooling time.

412. The following two meetings are proposed for 1969-1970:

(a) A meeting to exchange information on reprocessing highly irradiated fuels; this would provide an opportunity to discuss in detail the behaviour of nuclear material after irradiation, processes of separating highly irradiated fuels, and some advanced techniques for this kind of reprocessing; and

(b) A panel on the behaviour of cladding materials and moderators under radiation; the burn-up for nuclear power reactors is constantly increasing, new demands are made upon cladding materials and moderators and, after irradiation, additional problems arise in separating cladding and fissionable materials.

413. The work relating to safeguards and inspections is likely to increase in the coming years, and the most likely areas in which joint research activity might be indicated are the analysis of dissolver solutions in reprocessing plants and internal recycling in fabrication plants.

Reactor physics and research reactors

414. The feasibility of a reactor ultimately depends on the neutronic and nuclear processes occurring in it. Therefore, reactor physics is a pertinent subject for anyone concerned with reactors. All reactors must be considered in the light of the maintenance of reactivity (core life), stability, control and safety, overall breeding or conversion, and isotopic changes in fuel composition during irradiation. In addition, reactor physics is related to the effective utilization of research reactors to an intimate degree. Methods of controlling irradiation conditions, designing and operating experimental facilities, such as loops and beams, and measuring exposure by effective techniques of in-pile dosimetry are all reactor physics topics. These and related problems have been attacked in a number of ways, including the award of research contracts, the commissioning of manuals, the holding of meetings on specific technical topics, the forming of appropriate working groups and, most important, the encouragement of the personnel at nuclear centres in developing countries to meet among themselves and with experts in study groups. Inevitably, these study groups have ranged over a wider selection of topics of interest to the centres concerned. Finally, staff trained in reactor physics participate in many Agency activities as technical specialists, including acting as consultants for technical assistance projects and safeguards activities, and undertaking assignments for advisory missions and other specialized services to Member States and other Departments of the Agency.

415. The "burn-up" problem continues to be of vital interest, from the standpoints of safeguards, economics and operating procedures. The problem is to determine what

isotopic changes occur in fuel as a function of irradiation, including generation of the various plutonium or uranium isotopes. The Agency proposes to study available burn-up codes both from the standpoint of commercial uses and safeguards. If necessary, simplified computer programmes for estimating the fissile material content of reactor fuel will be developed in the Agency to provide the inspectorate with a simple and reliable means of estimating independently the fissile-material content of discharged reactor fuel prior to its chemical dissolution and analysis. A symposium on this topic, to be held jointly with the Department of Safeguards and Inspection, is proposed for 1971, and one or more panels of experts on the same topic are planned for the period 1971-1974. Various other aspects of the physics of power reactors will be under continuous study, including shielding, instrumentation, control and stability. The physics of fast reactors will be of major importance and will receive increasing attention.

416. Many of the problems concerning both burn-up and reactor control (as well as problems in nuclear economic planning) are now handled by automatic computers. Consequently the Agency plans increased activity in the whole field of application of computing to nuclear energy. As an example, various computational techniques which were reported at the 1967 Karlsruhe symposium which dealt with the calculation of heterogeneity effects in fast reactors should be compared and the differences reconciled.

417. The Agency can also contribute to the introduction of computer technology in developing countries. Since the reactor centres are already using modern techniques, they represent a useful avenue for such an introduction. In particular, the Agency could provide advice on the selection of computers for experimental analysis. The Agency's new computer will be used, as available, to provide occasional computing services to new reactor centres so that they can become acquainted with computer capabilities and acquire experience in preparing and presenting problems. Ultimately a joint regional project in one of the developing areas is envisaged. A panel on computer applications for such countries will be held in 1969 to advise the Secretariat on how best to provide such assistance. Already in 1968 the Agency is supporting a conference organized by ENEA on computer control of reactors.

418. The exchange of data and information in reactor physics is a continuing Agency responsibility. Some activities of this type are already being undertaken by ENEA, including physics data on light- and heavy-water reactor lattices, thermal and fast neutron spectra and few-group constants. The Agency must be prepared to support this activity. Another important topic is neutron cross-section data suitable for reactor calculations, including data inferred from critical and other integral experiments. This activity is currently the responsibility of a number of national and international centres and committees, the chief of which is INDC. Responsibility for this work in the Agency rests with the Nuclear Data Unit. Reactor physics assistance will be supplied to the Unit as needed, and the work of deriving reactor constants from integral data will be undertaken until the Unit is in a position to handle the job.

419. For 1969 a panel is planned to consider new techniques and principles, such as the use of noise and correlation measurements, for measuring reactivity. Other meetings in reactor physics in 1971-1972 will cover the following subjects:

(a) Advanced research reactors such as are now being designed to produce extremely high fluxes or high power bursts;

(b) Numerical calculations of reactors with the next generation of computers, which is very significant considering the increasingly sophisticated codes now manageable with the new computers and the advances to be expected; and

(c) Physics of reactors which might be designed with special requirements such as small volume, light weight, propulsion, or maximum unattended operation.

420. Also for 1971-1972, panels are proposed on the physics of reactor instrumentation and on the physics of fission systems (producers and blankets) used as complements to fusion systems.

421. The Agency will co-sponsor with ENEA a meeting of the International Liaison Group on Magnetohydrodynamics (MHD). This Group meets periodically to co-ordinate international work and exchange information. It was responsible for the organization of a symposium in 1966, and another one is being held in 1968. Depending on the progress achieved, future symposia will be held as required.

422. The Agency has a continuing programme in reactor radiation measurement, involving the development of universally accepted standard methods for measurement of neutron fluence and absorbed dose in reactors which are essential to correct interpretations of irradiation experiments. On the recommendation of a panel held in 1966 a working group has been formed to:

(a) Exchange information;

(b) Arrange intercomparison of results between laboratories for the improvement and standardization of techniques; and

(c) Meet to consider specific technical problems.

This group conducts its work largely by correspondence, but is scheduled to meet in 1970 and perhaps 1972 to keep abreast of developments and produce or bring up to date monographs on current technology. Research contracts will be awarded to develop more effective and simpler methods of in-pile dosimetry.

423. Closely allied with the problems of irradiation measurements is the development of techniques of irradiation. Proper interpretation of irradiation experiments requires that irradiation be carried out under stable and known conditions. Devices for this purpose may be in the form of "lazy susans", "rabbits", or "loops". Loops afford the opportunity to irradiate samples under varying temperatures, pressure, flow rate and coolant media, which makes it possible even for the smaller reactor centres to do useful experiments in heat transfer, corrosion, solid state physics, etc.

424. The Agency's continuing programme includes the consolidation of design and application experience, and it is hoped to summarize this experience in a commissioned monograph. Research contracts will aim at the development of one or more effective and easily constructed loops which can be used at a typical research reactor in a developing country. It will then be possible to utilize these loops in studies of heat transfer, corrosion, or other engineering problems. It is planned to hold a panel in 1970 to advise the Agency on how it can best serve Member States in this respect.

425. To promote the utilization of research reactors and achieve better progress in reactor physics, it is desirable to organize joint projects so that countries with common problems can supplement each other's personnel and such facilities as critical assemblies, sub-critical assemblies, specialized reactors, accelerators and neutron sources can be more fully utilized.

426. There are now three joint projects in research reactor utilization, as described below:

(a) The NORA project is based on an agreement between Norway, the United States and the Agency to do low-power reactor physics research on uranium water lattices. This project ends in the middle of 1968, having achieved its basic objectives of adding a significant amount of information on these lattices;

(b) The IPA project is based on an agreement between India, the Philippines and the Agency to do neutron spectrometry research with a crystal spectrometer donated by India and installed at the Philippines research reactor. The project ends in 1969. It has resulted in a number of research papers and has made it possible to perform further research not only in the Philippines but also in the Republic of Korea and Thailand, which have had personnel trained through technical assistance fellowships under the project; and

(c) The NPY project is based on an agreement between Norway, Poland, Yugoslavia and the Agency to collaborate on a broad variety of thermal reactor physics topics at sites in all three countries. It has enriched the reactor physics literature and the programmes in the countries involved and has served as a focus for advanced training of reactor physicists from developing countries through fellowships and summer schools. The agreement expires in April 1970. There is a possibility that the parties might wish to continue it or that, alternatively, it might be succeeded by more than one regional programme such as, for example, one involving Eastern Europe and another Scandinavia.

427. It is hoped to encourage and negotiate other joint regional programmes throughout the period 1969-1974. Topics would, of course, depend upon the interest of the countries concerned. The developing areas of Latin America, the Middle East and the Far East would be specifically encouraged to participate. In these regions an attractive topic might be the development of nuclear science and engineering curricula, instruction material and experimental teaching programmes jointly between universities and nuclear centres in several countries.

428. At the Agency's Symposium on Programming and Utilization of Research Reactors in 1961 it was mentioned that, in view of the existence of common regional problems, the organization of regional meetings of limited size would be highly desirable. Ten regional study group meetings have been organized so far, five in South East Asia and the Far East, two in Latin America and three in the Mediterranean area and Europe. These meetings have served to exchange information and to establish contacts among scientists within the region and with scientists from advanced countries. They have also been a useful forum for discussion of common problems.

429. A panel was held in November 1967 to evaluate the Agency's programme and to advise on its future direction. It appears that the need for this programme will continue through the forthcoming six-year period. It is proposed specifically to continue the study group meetings, using such savings as can be made to increase their frequency and impact. In particular, since a number of experts from advanced countries participate in these meetings, it may be possible at little cost to retain these experts to hold travelling seminars at several laboratories in the region. The intention is to enable an increasing number of less senior scientists in developing laboratories to participate.

430. A study group is scheduled to meet in the Far East in 1969. A panel in 1970 will review the programme again. In addition to purely scientific discussions, the study groups serve as a forum for discussion of more general programme problems in the nuclear centres involved. Since it is recognized that any sound programme of research reactor utilization must include the exploitation of educational opportunities at the nuclear centre, participants in study groups are encouraged to determine whether other forms of Agency activity in support of education at nuclear centres are desirable. Possibilities include the preparation of monographs and texts on significant teaching experiments with reactors and the encouragement of the development of teaching equipment and of the use of standard reactor experiments in curricula. Also worth exploring is the proper form of information exchange with regard to nuclear science and engineering education. A panel is scheduled for 1969 to further advise on educational uses of research reactors.

431. It has been recommended that the circulation of some type of newsletter, intended for the further improvement of communications between smaller reactor centres, be encouraged. It is hoped that this may be done by, or with the co-operation of regional organizations, but participation by the Agency, in a form still to be worked out, is necessary. It has also been recommended that the Agency use its good offices to expedite "sister laboratory" arrangements between advanced and developing centres, and this will be done.

Explanation of cost changes (1968/1969)

432. As shown in Table 20 above, the cost of the nuclear power and reactor programme is expected to increase by 4.79% in 1969. This increase is explained below.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$329 000	$347 200	$18 200 = 5.53%
Common staff costs	$122 500	$129 800	$ 7 300 = 5.96%

433. The $18 200 increase in salaries and wages and the associated increase of $7300 in common staff costs is due to the regrading of an existing P-1 post to the P-2 level, recruitment of a P-1 staff member to fill the post thus freed, recruitment of one additional GS staff member to assist with the increasing work-load of the Division, and the effect of salary increases approved and the post adjustment applied during 1968 but not reflected in the 1968 budget.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$205 500	$211 500	$6 000 = 2.92%

434. The net increase of $6000 for all other items represents an increase of $8500 for "Panels and committees" and an increase of $14 000 for "Scientific and technical services", which is attributable to the expected growth in the number of research contracts to be awarded for reactor studies, partially offset by a reduction of $11 500 in the estimate for "Seminars, symposia and conferences" and $5000 under "Duty travel and missions".

8. HEALTH, SAFETY AND WASTE MANAGEMENT

Summary of costs

Table 21

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	202 313	244 300	19 600	263 900	17 900	281 800
Common staff costs	75 740	90 700	4 900	95 600	5 800	101 400
Panels and committees	47 873	39 000	-	39 000	6 500	45 500
Seminars, symposia and conferences	9 228	18 000	(7 000)	11 000	3 500	14 500
Scientific and technical services	142 391	199 000	(7 000)	192 000	12 000	204 000
Duty travel and missions	18 187	23 700	(3 000)	20 700	800	21 500
Representation and hospitality	1 300	1 300	200	1 500	-	1 500
TOTAL	497 032	616 000	7 700 1.25%	623 700	46 500 7.46%	670 200

Programme

Highlights

435. This part of the programme deals with the work of the Division of Health, Safety and Waste Disposal in the Department of Technical Operations. This Division, in co-operation, where necessary, with other international organizations, establishes standards of health and safety in the fields of atomic energy; evaluates the health and safety hazards associated with projects submitted to the Agency and applies safety standards to the Agency's operations or operations assisted by it; undertakes studies and collects and disseminates information on the safe design and operation of facilities using radioactive materials and the safe management of radioactive wastes; promotes research and its co-ordination in the fields of health, safety and waste management; provides advisory services to Member States upon request in respect of health, safety and waste management, and renders assistance in case of radiation accidents. These functions are carried out by means of training courses, study tours, expert assistance, panels, symposia, seminars, research contracts, publication of technical manuals, special missions, and short-term technical assistance assignments.

436. The minor increase in estimated programme costs in 1969 is due to the addition of one P-1 post. The increased costs due to salary and other price increases are largely offset by a reduction in the number of symposia to be held, a reduction of $7000 in the estimated level of research contracts to be issued and a reduction of $3000 for duty travel and missions. The preliminary estimate for 1970 provides for the addition of one Professional and one GS post, one additional panel, an increase in the cost of research contracts and minor increases for scientific meetings and for travel.

Health and safety

437. The Agency's programme in health and safety is concerned with the development of safety standards applicable to the use of radiation sources, with the collection and dissemination of information through scientific meetings, panels of experts, co-ordinated research programmes and publications of various types, and with helping Member States to apply the standards and to put into practice appropriate recommendations and make use of information through advisory services, training courses, study group meetings and other global and regional projects.

438. Advisory services relating to all general problems of radiation protection will be provided to Member States on request, where appropriate, in collaboration with ILO and FAO. Advice on the safety of proposed movements of irradiated fuels will also be provided. Radiological protection services will be provided for the Agency's laboratories and for staff who may be exposed to radiation in the course of their duties.

439. The Agency will continue to act as an intermediary in the provision of emergency assistance in the event of radiation accidents and to provide a limited amount of direct assistance from its own resources. Information concerning the types of assistance that might be made available by Member States will continue to be collected and distributed in collaboration with WHO and FAO.

440. Health and safety measures will be applied to Agency-assisted projects and health and safety inspections will be performed as necessary.

Safety Standards

The programme for 1969-1970

441. Activities proposed for 1969 are discussed below:

(a) The Agency's Regulations for the Safe Transport of Radioactive Materials, which have been adopted by the majority of international transport organizations and incorporated in national legislation by a number of Member States, will be kept technically up to date in accordance with the procedure established by the Board, if necessary with the help of consultants;

(b) Further studies will be pursued, in collaboration with ISO, on the design and testing of packagings; any detailed packaging designs that Member States submit for incorporation or reference in the appropriate Annex of the Regulations will be reviewed by a panel of experts. Further attention will also be given to the use of facilities available in Member States as internationally accepted testing facilities under the auspices of the Agency; and

(c) The Agency's Basic Safety Standards for Radiation Protection will be kept under review, particularly with regard to any further work by ICRP, and revised, if necessary, in accordance with the procedure established by the Board.

442. The activities proposed for 1970 are discussed below:

(a) A panel will be convened to undertake the first major review of the Agency's Regulations for the Safe Transport of Radioactive Materials, which has not been reviewed since 1964; this will include consideration of the transport of wastes in disposable containers and will take account of the experience of radioisotope producers and users in applying the regulations;

(b) Any detailed packaging designs submitted by Member States for incorporation in the transport regulations will be reviewed by a panel of experts; and

(c) For economic and practical reasons it is necessary to develop methods of calculation to demonstrate that proposed packagings of large radioactive sources meet the requirements of the transport regulations, and it is proposed to organize a seminar on the application of the complex procedures involved.

The programme for 1971-1974

443. During the two-year period 1971-1972 the Agency will continue its activities relating to the safe transport of radioactive materials and the basic safety standards for radiation protection. Guidelines will be proposed for the safety assessment of products which contain radioisotopes and which are available to the public.

444. During 1973 and 1974, the implementation and up-dating of the Agency's transport regulations will be pursued systematically, since means of transportation will be improved and changed to meet new requirements and developments in nuclear technology. Attention will be devoted to legislation related to radiation protection.

Operational technology

The programme for 1969-1970

445. The activities proposed for 1969 are discussed below:

(a) A symposium will be organized on the handling of radiation accidents involving the exposure of persons; this would review the methods employed for dealing with such accidents, including detection and evaluation, remedial measures, the decontamination of premises and equipment and the investigation of exposed or contaminated persons. As this topic is also of interest to WHO and FAO, their collaboration will be sought. The information provided would serve as a complement to the manual on planning for the handling of radiation accidents prepared by the Agency in association with WHO and FAO;

(b) A symposium will be organized on the safety aspects of hot laboratory equipment and remote-control systems, to consider in particular safety and engineering problems and previous operating experience with the handling of volatile fluorides during the reprocessing of irradiated fuels and with other remote-controlled processes;

(c) Since a number of different types of dosimetry systems has been developed for assessing the doses received by persons involved in radiation accidents but there have been few opportunities for evaluating their performances in accident conditions, it is proposed to convene a panel to review available systems and to make recommendations. As a possibility now exists for simulating conditions prevailing in some types of radiation accidents using a special testing reactor, it might be feasible to arrange for comparative studies of different systems;

(d) As it is likely that its increasing availability will lead to the more widespread use of plutonium in comparatively small amounts, a panel will be convened to prepare a manual of guidance on the safe handling of plutonium in quantities smaller than those at which criticality can conceivably occur; and

(e) Manuals and guide-books will continue to be prepared with the help of consultants. It is proposed to produce a manual on shielding materials for radiation protection and to collaborate with WHO in the preparation of a guide-book on radiation protection in hospitals; a booklet will be issued on the establishment and keeping of monitoring records, and other manuals and guides will be prepared as needed.

446. Proposals for 1970 are based on the following considerations:

(a) As adequate monitoring is essential for an effective radiation protection programme, it is important that recent developments in methods of measuring radiation dose should be made as widely known as possible. It is therefore proposed to organize a symposium on new developments in physical radiation detectors which would consider such subjects as choice of detector, evaluation of performance and reliability under adverse climatic conditions;

(b) A number of countries are actively considering setting up facilities for manufacturing fuel elements, and it would therefore be opportune to convene a panel of experts to prepare a manual on safety aspects of reactor fuel fabrication;

(c) Although the metabolic behaviour of the radioactive elements of high radiotoxicity is of prime importance in the determination of maximum permissible intakes, there are varying views regarding the interpretation of some of the available information; it is proposed, therefore, to convene a panel of experts to consider the evaluation of body retention and excretion patterns of rare-earth elements, including radium and plutonium; and

(d) With the help of consultants it is proposed to undertake a revision of the Health Physics Addendum to the Manual on the Safe Handling of Radioisotopes which was published in 1960.

The programme for 1971-1974

447. During the two-year period 1971-1972, it is expected that the exchange of scientific and technical information by means of symposia and seminars will be continued and some of the topics proposed for such meetings include neutron dosimetry and spectrometry, air monitoring, assessment of radioactive burden in man, handling of radiation accidents involving radiation exposure of personnel, trends in environmental control around nuclear installations, the use of computers in health physics, the relationship between radiation protection and industrial hygiene, and safety in the nuclear industry. Some problems in radiation and chemical safety will arise in connection with the development and wider use of fast breeder reactors, which are likely to be of interest to many countries and may have to be reviewed at a special symposium.

448. It is proposed to convene scientific seminars on safety problems associated with safeguards operations and on the standardization of terms used in applied health physics. Scientific panels on the calibration and performance checking of radiation protection instruments in situ, neutron dosimetry, radiation protection at accelerators and health supervision in safeguard operations will be arranged as appropriate. Problems arising in the application of radiation safety standards to uranium and thorium mines are also planned to be discussed by a panel.

449. By 1973-1974 it can be expected that some of the problems associated with the application of current radiation protection standards in the uranium mining industry will be resolved. It is also expected that by that time developments in nuclear technology and consequent increases in the quantities of high-level wastes will call for a review of the safety aspects of the storage of such wastes. A number of fast breeder power reactors may be in operation and it will be useful to have an exchange of information on the experience and problems relating to operational health and safety in such reactors. These subjects will receive attention in the programmes of symposia and scientific seminars, in addition to the traditional subjects such as neutron monitoring, monitoring of high-energy photons and particle radiation, remote manipulation systems and treatment of personnel with accidentally incorporated radioactive materials.

Research co-ordination

450. The programme proposed for 1969 is as follows:

(a) The system under which abstracts of research on health physics topics in progress or recently completed in Member States are collected and distributed will be continued; and

(b) Support will continue to be given to research in selected topics that have an immediate bearing on the Agency's activities in radiation protection, preference being given to topics recommended by research co-ordination meetings and proposed by institutes in developing countries.

451. For 1970 it is proposed, in accordance with the recommendations of the panel on co-ordination of national research programmes in health physics, to organize a research co-ordination meeting on biological radiation detectors.

452. Abstracts submitted by Member States on research on health physics topics in progress or recently completed will continue to be collected and distributed.

453. During 1971-1972 scientific meetings for the co-ordination of national research programmes in health physics will be organized as developments demand. Information on research in health physics completed or in progress in various Member States will continue to be distributed. During 1973-1974 scientific meetings for the co-ordination of research in biological dosimetry in progress in various Member States will be organized. The collection and dissemination of abstracts of research in health physics will continue.

Training

454. Subject to the availability of funds, a short training course, including field exercises, in the Middle East and Mediterranean region on planning for the handling of radiation accidents is proposed for 1969; this would be a repetition of the course held in the Philippines in 1967.

455. In 1970 it is hoped to organize:

(a) A training course in the Agency's Laboratory on bio-assay methods; this will be a repetition of courses organized there in 1963 and 1967;

(b) A visiting seminar, in South East Asia and the Far East on the choice, use, calibration and maintenance of radiation monitoring instruments, which was planned for 1967 but did not take place; and

(c) A short training course in Latin America, if possible in collaboration with WHO and FAO on planning for the handling of radiation accidents, similar to those held in the Philippines in 1967 and in the Middle East and Mediterranean region in 1969.

456. During the two-year period 1971-1972, subject to the availability of funds, training courses in planning for the handling of radiation accidents will be conducted in the Middle and Far East, and a training course on whole-body counting will be organized. Regional study group meetings will also be arranged and in addition to general health physics, special topics such as radiation protection legislation and interpretation of results obtained in radiation surveys will receive attention.

457. Activities during 1973-1974 cannot now be exactly foreseen, but it is expected that training courses in planning for the handling of radiation accidents and in bio-assay and in other appropriate subjects will be repeated, provided that funds can be made available.

Studies and services

458. A number of developing countries have indicated that they find difficulty in framing national legislation and regulations that are appropriate to their circumstances and it is therefore proposed to organize in 1969 an inter-regional study group, possibly in an African country, to discuss the guidelines on the subject that have been prepared by the Agency.

459. A small group of consultants will be convened in 1969 to review the Agency's internal arrangements for facilitating the provision of emergency assistance to Member States in the event of radiation accidents.

460. Proposals for 1970 are discussed below:

(a) As it is important for the Agency to keep abreast of information on hazards to which travellers in outer space may be subjected either as a result of natural radiation or radiation from nuclear propulsion devices, it is proposed to appoint small groups of consultants to report on radiation protection and monitoring problems in space travel and on health and safety questions connected with the release of hot particles into the atmosphere;

(b) As a continuation of the series of successful meetings a regional study group on health physics will be organized in a country in South East Asia or the Far East; and

(c) Manuals and guide-books will be prepared, if necessary with the help of consultants, as the need arises.

461. Planning of activities for the two-year period 1971-1972 will include the following:

(a) The postal calibration of gamma-radiation fields in Member States by means of glass dosimeters is expected to be prolonged, since requests from Member States for such calibration are expected to increase;

(b) Study group meetings on some aspects of radiation protection will be organized in different regions of the world to meet requests of developing countries; and

(c) The establishment of regional dosimetry centres in co-operation with other international organizations will be an important part of the Agency's activity in 1971-1972 and will continue thereafter.

462. Some of the existing manuals in the Safety Series will be revised and up-dated in the course of 1971-1972. With the help of consultants it is proposed to issue additional manuals on remote manipulation facilities for the handling of highly active materials and on health and safety considerations in the design of laboratories handling radioactive materials.

463. Advisory services to developing countries in solving certain problems connected with radiation protection that do not warrant long-term technical assistance will, as in the past, be rendered through correspondence or by short visits of experts. The services are expected to increase each year as the uses of atomic energy in Member States expand and as more establishments become aware of these services. The Agency will cover the cost of consultants or participating staff, and will continue to integrate its activity with that of other international organizations to the extent possible.

464. During 1973-1974 regional study group meetings on radiation protection legislation will be continued. A study group meeting on health physics problems in tropical countries is also envisaged.

465. A number of existing manuals in the Safety Series will be reviewed and revised. Additional manuals on radiation hazards from nuclear space vehicles and health physics in nuclear desalting plants will be prepared. A guide-book on the use of solid-state dosimeters for personnel dosimetry will be issued.

466. Symposia, seminars and panels on certain subjects may need to be repeated around 1974. Space exploration, in particular, may have advanced enough to warrant the repetition of a meeting on problems of environmental contamination of the atmosphere in case of accidents involving space vehicles using nuclear power or containing radioactive materials.

Waste management

467. Satisfactory methods of treatment and disposal of low-level radioactive liquids, gases and solids have been developed and the Agency has played an important role in disseminating the relevant information to Member States. The role of the Agency in the future must include not only informing those Member States with recent waste management problems of available methods of solving them but also keeping all Member States aware of the most recent developments and innovations. A five-year cycle of discussions of low-level waste management problems is considered adequate.

468. Increasing emphasis is being placed on management of high-level wastes; experience in this respect is still limited, and the Agency's responsibilities lie in the encouragement of research and in the dissemination of information. Through a growing research contract programme, the co-ordination of efforts to develop safe, economical systems for the management of high-level wastes will be intensified. Panel meetings will be convened on the most promising methods or aspects in the more advanced stages and symposia will be used to maintain an awareness among interested Member States of all developments.

469. It is planned to increase the effort devoted to treatment of gaseous wastes. The chemistry of the noble gases is now being formulated. Possibilities of achieving the dual goals of decontaminating gaseous effluents of their radioactive noble gases and recovering valuable elements, as xenon and krypton, for re-use are promising. The Agency plans to continue to support this work.

470. For the general information of all Member States, publication of the sea disposal register is planned as a continuing programme with an annual report. The inclusion of monitoring reports from all possible sources is planned. In addition, annual reports of disposals into international rivers and lakes are being arranged for an international "River-Lake Register". Progress is, of course, dependent upon the co-operation of the Member States concerned.

471. In furtherance of the Agency's role as a centre of information, a Directory of Waste Management Plants will be published and kept up to date; brief descriptions of all systems for management of all levels of gaseous, solid and liquid wastes will be included. To keep Member States abreast of progress in waste management research, the Waste Management Research Abstracts will continue to be published on an annual basis.

472. As the safeguards programme expands to cover increasing numbers of reactors, fuel reprocessing and other facilities, it is felt that waste disposal personnel will be required to assist in those aspects of inspections which relate to waste emissions and that the services of one staff member will have to be reserved for this purpose.

473. In co-operation with the Department of Technical Assistance, it is planned to increase advisory services on waste disposal. In many cases, the services of a staff member can prove invaluable in advising a Member State on the best use of equipment and expert services for the solution of a particular problem.

Operational technology

474. Activities proposed for 1969 are discussed below:

(a) The removal of radioactivity by groundwater from buried contaminated solids has been discussed in waste disposal meetings since the Agency was organized. Leachability of radioactivity has been reported on the basis of tests devised by the user and in terms determined as appropriate in each individual case. A group of consultants will be convened in 1969 to propose a standard method of leach testing for all Member States;

(b) To review the use of mineral resources in the management of radioactive wastes, a panel will be held in 1969. Mineral resources normally afford the most economical means of treating and disposing of wastes, and the recommendations of the panel could provide valuable information for Member States which expect to have waste management problems; and

(c) Publication of information on the use of mineral resources will be accompanied in 1969 by comprehensive reviews of the use of bitumen for insolubilizing wastes and of the application of the freeze-thaw process for sludge concentration. Reports on operational units will also include information on vacuum filters for sludge dewatering and solids-contact units in chemical treatment operations.

475. By 1970 the development of the chemistry of the noble gases and studies of the possibilities of their recovery from off-gases for re-use will have advanced sufficiently to warrant conducting a seminar on the subject. Agency meetings and research contract work in 1968 and 1969 will by then have provided the basis for the "by-product" approach to air cleaning problems.

476. Advances in practices in the treatment of low- and intermediate-level radioactive wastes will be the principal topic for a symposium proposed for 1970. An identical meeting was held in 1965 and it is believed that the advances during the intervening five years and the reports of installations not mentioned in 1965 will provide abundant information.

477. A meeting of consultants will be called in 1970 to consider revision of the publication entitled "Radioactive Waste Disposal Into the Ground" [15]. Though much of the content of the present edition may be unchanged, extensive developments in mine storage have occurred since its publication and should be included.

478. To provide more specific and interesting data on operating practices or units, the "booklet" series may be extended to include information on sedimentation tanks in use in chemical treatment plants and the disposal of disused installations formerly handling radioactive materials.

479. As the fast reactor programme develops in scope and size, consideration will be given to the desirability of convening a panel in 1970 to study the aspects of solid, liquid and gaseous waste emissions.

480. The Agency has for a number of years promoted the study of solar evaporation for the treatment of low-level liquid radioactive wastes in countries with proper climatic conditions. A panel may be convened in 1970 to discuss the advances made and advise on the desirability of continued research.

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[15] Safety Series No. 15.

481. Planning of activities for the two years 1971 and 1972 is based on the following considerations:

(a) The five-year-cycle plan for dissemination of operational information, as promulgated by the panel held in January 1967, envisages symposia on treatment and disposal of high-level wastes and the health and safety aspects of the disposal of radioactive wastes into seas, oceans and surface waters. It is likely, also, that a seminar on the use of bitumen or cement for insolubilization, or on a particularly attractive treatment method for high-level liquid wastes, or on newly developed disposal operations, may be desirable; and

(b) Panel meetings on the use and acceptance of the 1967 economics report, aspects of the safeguards programme, and new concepts in waste treatment methods are also foreseen. Several publications in the Safety Series will require up-dating by consultants, and guide-books on newly proven processes in waste management should be published.

Research co-ordination

482. To encourage research into waste management problems in the developing countries and to assist in co-ordinating such research, regional co-ordination meetings will continue to be held in 1969. Though the problems in the Central and South American areas are not yet pressing, it is necessary and most beneficial to establish and co-ordinate research in that region during the early stage of development of the uses of nuclear energy.

483. Although electrodialysis is a well-known and established chemical engineering process, which is receiving considerable attention in several countries, it has so far had very limited application to the treatment of radioactive wastes but its continued development enhances its suitability. A meeting of research workers in electrodialysis, electrodeionization and other new methods will be held in 1969 to promote the co-ordination of efforts to increase their applicability to the management of radioactive wastes on a smaller scale.

484. In a continuing effort to keep all Member States aware of research and development in waste management, reviews of work accomplished will be published on an annual basis in the form of abstracts.

485. By 1970, the use of organic long-chain polyelectrolytes in the chemical treatment of radioactive liquid wastes will have been investigated sufficiently to warrant a meeting of interested research scientists to discuss the application of these materials, the areas in which more study is needed and to resolve minor problems which may have arisen. The meeting would provide the opportunity to co-ordinate efforts and reduce duplication.

486. A meeting of research scientists in the Central European and Baltic area may be called in 1970 to co-ordinate general waste management research in that area, to review Agency research contract work and to promote additional research. The regional meeting would be a continuation of similar meetings of previous years for the encouragement of research.

487. During the two-year period 1971-1972, regional meetings for the co-ordination of waste management research and development, and the promotion and co-ordination of Agency contract work could appropriately be held in the Far East and, in 1971, perhaps in Africa.

International co-operation

488. During 1969, continuation of the effort to report all disposals of radioactive solids and liquids into the seas will be attempted through the publication of the "Sea Register" with the co-operation of Member States. With the aid of consultants, the incorporation in the document of monitoring reports will be considered. Extension of this

register to cover international lakes and rivers will be considered; a separate document prepared by the countries concerned is envisaged.

489. The Directory of Waste Management Plants will be kept up to date to provide information for the use of all Member States. The Directory will continue to include data on all waste management facilities - handling high-, medium- or low-level radioactive, liquid, solid or gaseous waste - of all Member States. Similarly, during 1970 continuation of the publication of the "Sea Register", the "Rivers-Lakes Register" and changes and additions to the Directory of Waste Management Plants are planned. It is hoped that by this time, monitoring data on the seas, lakes and rivers will be included.

490. During the two-year period 1971-1972, publication of data on waste discharges into seas, lakes and rivers is expected to continue. Maintenance of a current waste management directory is also planned.

491. With regard to general activities in the area of waste management, it is to be expected that during 1973-1974 the subjects of symposia on operational techniques will include disposal of radioactive wastes into the ground and treatment and disposal of airborne wastes. Other meetings of the symposia or seminar type would possibly be concerned with recovery of by-products from waste streams, high-level waste treatment processes or waste disposal operations. Panels would be concerned with the most promising new developments in waste treatment and disposal.

492. If the continuation and extension of the research contract programme is advisable in 1973-1974, co-ordination meetings will probably be convened in Central Europe and South America. It is expected that the register of waste disposals into international waters will continue to be published indefinitely, as will the Directory of Waste Management Plants.

493. The programme of the International Laboratory of Marine Radioactivity at Monaco is being closely integrated with the general programme on waste release into the sea. It is proposed to convene in 1969, together with the Monaco Laboratory, a panel on technical measures to be taken in case of radioactive contamination of any sea area. The programme of the Monaco Laboratory is described in paragraphs 506 to 519 below.

Nuclear safety

494. Up to September 1967, that part of the Agency's work which is concerned with reactor safety and criticality control [16] was the joint responsibility of the Divisions of Health, Safety and Waste Disposal and of Nuclear Power and Reactors. In that month a new section was formed in the former Division in order to deal more efficiently with this work.

495. Within this part of its programme, the Agency will continue to assist and advise Member States on the safe design, operation, siting and containment of reactors and installations with potential criticality hazards. Advisory panels will be convened as appropriate. The Agency will also provide advisory safety assessments of particular operations and installations upon request. This type of work is expected to increase at a steady rate for the next few years. The number of projects which the Agency assists through the provision of nuclear materials can also be expected to increase steadily. Under the terms of each project agreement the Agency has the right to perform at least one health and safety inspection to confirm that adequate health and safety measures are being applied. This has been exercised in a few cases in the past and it is felt that the number of health and safety inspections should be increased if the Agency is to ensure that adequate health and safety measures are in force and to demonstrate its concern with the quality of the radiation hazard control applied to projects that it assists.

496. Operational safety work of the Agency is being planned to enable the developing countries to draw the maximum benefit from available experience. The collection and dissemination of information required to ensure a high degree of safety is the main purpose of most of the work proposed for the period 1969 to 1974 which is outlined in the following paragraphs.

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[16] See document GC(X)/332, paras 181-189.

The programme for 1969-1970

497. Activities proposed for 1969 include:

(a) A panel to provide guidance on the preparation of safety evaluation reports for reactors;

(b) Departing somewhat from the usual type of reactor safety work, the convening of a panel on the safety aspects of the peaceful uses of nuclear explosives; this meeting originally proposed for 1968 was, at SAC's suggestion, postponed to 1969; and

(c) A probable increase in the work of appraising existing facilities and organizations during the period 1969-1970 and in the following years, which would include visits to the facilities as well as the review of and recommendations on organizational and procedural matters.

498. Activities proposed for 1970 are discussed below:

(a) A panel meeting on methods for the collection and use of data on reactor component reliability as applied to reactor safety analysis and siting is proposed;

(b) Another meeting suggested by Member States is a panel on earthquake safety guidelines for the selection of reactor sites;

(c) One of the very real difficulties in ensuring a reasonable degree of safety being the assessment of risk in quantitative terms, a panel to establish a realistic cost/risk relationship is planned; and

(d) Since the Agency may possibly have a useful part to play in the collection and return to storage or processing facilities of spent fuel from research reactors in countries in which such facilities do not exist, a panel to examine the possible role of the Agency in such work will be held.

The programme for 1971-1974

499. During 1971-1972, meetings are likely to be convened on topics which will include:

(a) Changes and trends in reactor control systems, i.e. liquid control rods etc.;

(b) The problems of radiocontaminants released to the environments of more than one country;

(c) Collection and use of data from reactor accidents or near-accidents;

(d) De-commissioning and dismantling of old or obsolete reactor systems; and

(e) A travelling seminar on reactor safety, siting, etc., for an appropriate region.

500. The need for advisory missions on reactor siting and safety review missions is expected to increase. In addition, the Agency should avail itself more fully of its statutory rights to inspect or re-examine established Agency-sponsored operations to ensure that sound safety practices are being observed. The review of organizational and procedural reports is also expected to increase.

501. Planning for the years 1973-1974 can at this stage only be based on the assumption that some of the work will consist of organizing meeetings for the collection and dissemination of information and the solution of particular problems, and that such meetings are likely to cover such topics as:

(a) The experience gained to date in the use of technical personnel for more than one purpose; the idea here is that, in small operations, the same people can act as nuclear safety engineers, health physicists, industrial hygienists, industrial safety engineers, and fire protection specialists, over-specialization when not required being expensive and a waste of talent;

(b) The use of on-line computers directly related to operational safety;

(c) The problems of reactors sited in large cities; and

(d) Safety problems in connection with energy centres.

502. The general trend of work in nuclear safety should reflect the expected increase in the number of nuclear power plants, particularly in developing countries. Ideally, this work should not only reflect such changes but should anticipate them in order to allow relatively inexperienced new operators to draw the maximum benefit from the experience gained elsewhere, with the consequent saving of time, talent and money. Although it is difficult to strike a good balance between unsafe, realistically safe and super-safe conditions, the collection and dissemination of information aimed at enabling all countries to achieve a proper balance in operational safety will be one of the main purposes of this work during the coming years. The choice of subjects for symposia, panels and seminars and the advice and assistance provided will be based on this criterion.

Explanation of cost changes (1968/1969)

503. Although the budget estimate for 1969 provides for an increase of approximately 8% in salaries and wages, this increase is largely offset by reductions elsewhere so that the net increase for this programme, as shown in Table 21 above, is only $7700, or 1.25% over the approved budget for 1968. The changes in costs may be summarized as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$244 300	$263 900	$19 600 = 8.02%
Common staff costs	$ 90 700	$ 95 600	$ 4 900 = 5.40%

504. The increase in "Salaries and wages" and the associated "Common staff costs" is due to the proposal to provide one additional P-1 post and one GS post, and to increases in emoluments of GS and M&O staff and a post adjustment for Professional staff in 1968.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$281 000	$264 200	($16 800) = (5.98%)

505. The costs in respect of scientific meetings, research contracts, travel, and representation and hospitality under this programme are expected to decline by $16 800 below the level approved for 1968. There is a reduction of $7000 under "Seminars, symposia and conferences" since it is proposed to hold only two symposia in 1969, as compared with three in 1968, a reduction of $7000 in research contracts and a reduction of $3000 under "Duty travel and missions". These reductions are offset by a minor increase of $200 under "Representation and hospitality".

9. INTERNATIONAL LABORATORY OF MARINE RADIOACTIVITY

Summary of costs

Table 22

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	97 441	102 000	11 000	113 000	9 000	122 000
Common staff costs	31 655	27 500	7 500	35 000	2 000	37 000
Duty travel	2 423	3 000	1 000	4 000	500	4 500
Library	318	500	-	500	300	800
Scientific supplies and equipment	11 471	14 500	4 000	18 500	1 700	20 200
Common services, equipment and supplies	3 653	5 500	(500)	5 000	500	5 500
TOTAL	146 961	153 000	23 000 15.03%	176 000	14 000 7.95%	190 000
Source of funds:						
Regular Budget Section 11	101 869	108 000	23 000	131 000	14 000	145 000
Operating Fund I	45 092	45 000	-	45 000	-	45 000
TOTAL	146 961	153 000	23 000	176 000	14 000	190 000

Programme

Highlights

506. The Monaco Laboratory was established in 1961 as a co-operative venture between the Agency, the Monegasque Government and the Oceanographic Institute in Monaco for joint research on the effects of radioactivity in the sea. [17] The initial programme of research placed emphasis on the oceanographic studies and basic research to be undertaken by the Laboratory. Over the years there have been a number of changes in the direction of the Laboratory's work to reflect reviews made both by the Board and by the Secretariat.

507. With a view to determining the part that the Laboratory should play in the Agency's new six-year programme on the subject of waste management and particularly on marine releases of waste, the programme was re-oriented to place more emphasis on standardization and co-ordination and less emphasis on basic and scientific studies. On this re-oriented basis, the Board in June 1968 authorized the Director General to conclude an agreement providing for the continued operation of the Monaco Laboratory for an additional six years. The objectives and programme for this period are outlined below.

[17] INFCIRC/27.

General

508. For the purpose of studying on an international scale the health and safety aspects of the radioactive pollution of the sea, the Laboratory will study and promote the development of reference analytical methods and techniques for investigating the effects of radioactivity on marine biota. The Laboratory will promote the adoption of such methods and techniques by national and international institutions that are studying the effects of radioactivity on marine biota and the behaviour of radionuclides in marine environment, so as to ensure the comparability of the results obtained.

509. The Laboratory will also develop and recommend technical measures that should be taken in the event of accidental radioactive contamination of the sea and will assist Member States with regard to marine radioactivity problems.

Standardization

510. The Laboratory will continue and expand its collection of comprehensive information about the different analytical methods, radiochemical as well as chemical, being used to determine the composition and quantity of radionuclides in sea water and in marine biota. It will establish the accuracy of such methods by arranging for comparison of the results obtained by various collaborating laboratories. Panels of experts will also be convened to evaluate these methods with a view to the eventual introduction of standardized methods. The work that the Laboratory will do in co-ordinating research agreements and contracts will also contribute to the progress towards standardization.

511. It is at present very difficult to obtain comparable results from experiments done in laboratories and in the sea or the ocean itself on the uptake and loss of radionuclides by marine biota. One task of the Laboratory will be to develop a series of "normalized" experiments - that is, standard experiments that will give results that are fully comparable.

Scientific and technical studies

512. The chemical behaviour of certain radionuclides in sea water has not yet been accurately determined. The Laboratory will therefore continue specific studies on the behaviour in sea water of a variety of elements which are essential components of nuclear waste or whose behaviour is very similar to that of certain crucial radionuclides (chromium, cobalt, ruthenium and zinc, for example). In carrying out these studies the Laboratory will continue to take account of the work that is being done by national institutes.

513. The Laboratory is already studying the interactions between radionuclides and the sediments of the sea bottom by using characteristic samples of such sediments taken from different places. Knowledge of these interactions is needed to permit accurate prediction of the behaviour of radionuclides dispersed near the sea bottom.

514. One of the problems arising out of the dispersion of radionuclides in the sea as a result of waste disposal or of fall-out is to determine the somatic and genetic effects that different levels of radioactivity and types of radionuclides have on marine biota. A panel of experts will be convened in 1969 or 1970 to discuss in detail the situation then prevailing with regard to this problem and to give advice about the desirable future research.

Co-ordination of research

515. The Laboratory's own work on standardization, together with its own scientific and technical studies, will help it to serve as the focal point for the Agency's programme to co-ordinate the research being done by national institutes on marine radioactivity.

Twenty-five institutes in various parts of the world have already been invited to join in the work, seven research agreements have been concluded with institutes in the Mediterranean area and it is expected that the programme will expand considerably in the years ahead. A meeting of the participating institutes will be convened in 1969 or 1970 to discuss the distribution and movement cycles of radionuclides and related trace elements in the marine environment.

Measures required in the event of accidental contamination of the sea

516. In the event of an accidental release of radioactivity into the sea, for instance by a nuclear facility or a nuclear-powered ship, there are several technical measures that can and should be taken to limit the dangerous consequences to marine life. For this purpose one must be able to predict as accurately as possible the drift and subsequent dispersion of radionuclides in the water and the maximum concentration likely to result. The Laboratory will therefore continue to study diffusion processes with a view to the prediction of such drift as well as the size of and maximum concentration of radioactivity in contaminated patches of sea water.

517. In the event of an accidental release remedial action can be taken to bind the radionuclides onto particles of sediment and thus to cause them to sink from the surface water into a deeper layer or to the sea bottom. The Laboratory will therefore continue its studies on the binding efficiency of sediments in relation to various radionuclides under laboratory conditions and, as far as possible, under natural conditions as well. A panel of experts will be convened in 1969 or 1970 to discuss the technical measures that should be taken in the event of accidental radioactive contamination of an area of the sea.

Assistance to individual Member States

518. It is to be foreseen that with the increasing development of nuclear power, particularly in developing countries, many atomic energy authorities and reactor operators will have to deal with problems arising from the release of liquid waste into the sea, and that they will consequently need advice and help from the Agency with studies of the movement and other behaviour of radionuclides dispersed in local waters and of the effects of radionuclides on local marine biota. The Laboratory will on request make available the services of members of its staff for limited assignments as consultants, and will be prepared to undertake research on specific urgent problems of Member States, especially of those that do not have their own facilities for such work.

519. In the past the Laboratory has provided training for some scientists from developing countries. More space is now available for this purpose and the Laboratory will continue to provide a limited service of this type (to the extent that this does not impede its other work), especially to Member States that do not have specialized training facilities of the kind required.

Explanation of cost changes (1968/1969)

520. As shown in Table 22 above it is estimated that total costs of the Monaco Laboratory will increase by 15.03% in 1969 compared with the approved budget for 1968. The major items of increase are as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$102 000	$113 000	$11 000 = 10.8%
Common staff costs	$ 27 500	$ 35 000	$ 7 500 = 27.3%

521. The increase in "Salaries and wages" and the associated "Common staff costs" in 1969 arises from Monaco post adjustments and salary increases for the existing staff and the addition of one P-1 and one GS post. The increase in "Common staff costs"

represents a percentage higher than normal because this item was underestimated in the 1968 budget, as indicated by actual cost experience in 1967.

522. The breakdown of salaries and wages costs for the Monaco Laboratory in the form shown in Table 50 of the Regular Budget is shown below.

Table 23

1967	1968	1969	Position	1967 $	1968 $	1969 $
1	1	1	P-5 Senior Officer	13 110	13 110	13 110
3	3	3	P-4 First Officer	32 190	32 190	32 190
			P-3 Second Officer			
			P-2 Associate Officer			
-	-	1	P-1 Assistant Officer			5 690
4	4	5	Sub-total	45 300	45 300	50 990
10	11	12	General Service Staff	35 000	38 500	42 000
14	15	17	Total	80 300	83 800	92 990
			Special post and other allowances	10 089	10 860	11 500
			Salary increments	6 302	7 340	8 510
			Sub-total, established posts	96 691	102 000	113 000
			Add: Consultants	750	-	-
Total, salaries and wages				97 441	102 000	113 000

	1968 budget	1969 estimate	Increase in 1969
All other costs	$23 500	$28 000	$4 500 = 19.15%

523. The major increases in 1969 are: $1000 for travel to allow some increase in travel in connection with the Laboratory's new co-ordination role, and an increase of $4000 for scientific supplies and equipment in order to equip the Laboratory properly to meet its role of applying standardized analytical methods and in serving national laboratories in standardization and inter-calibration matters. These increases are partially offset by a minor decrease of $500 for common services, equipment and supplies, based on actual cost experience in 1967.

10. INFORMATION AND TECHNICAL SERVICES

Summary of costs

Table 24

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	488 999	575 700	95 000	670 700	67 900	738 600
Common staff costs	183 007	217 100	37 400	254 500	23 300	277 800
Panels and committees	6 089	13 000	(6 500)	6 500	-	6 500
Seminars, symposia and conferences	1 465	-	16 800	16 800	(5 800)	11 000
Distribution of information	157 437	216 000	(10 000)	206 000	24 000	230 000
Scientific and technical services	6 260	12 000	32 000	44 000	33 000	77 000
Duty travel and missions	10 279	17 300	-	17 300	1 300	18 600
Representation and hospitality	472	800	600	1 400	300	1 700
Common services, equipment and supplies	168 991	257 000	27 000	284 000	(16 000)	268 000
TOTAL	1 022 999	1 308 900	192 300	1 501 200	128 000	1 629 200
			14.69%		8.53%	

Programme

Highlights

524. This part of the programme covers the work, and the related costs, of the Division of Scientific and Technical Information (except for scientific conference administration), the Public Information Division and that part of the Documents Services which is shown in the Appropriation Section for Distribution of Information (12 GS and 9 M&O posts). The increased costs estimated for 1969 are entirely due to the INIS programme, the computer operation, or increases in salaries and common staff costs, as well as a post adjustment in 1968. The preliminary estimate for 1970 provides for further cost increases in respect of INIS and the publications programme, partially offset by a decline in computer costs after complete conversion of computer output to the Agency's own computer as explained in the budget under Appropriation Section 10 [18].

General

525. It is expected that the Agency will, throughout the period 1969-1974, continue to carry out its statutory function with regard to the exchange and distribution of information

[18] See para. 676.

on the peaceful uses of nuclear energy through scientific meetings, scientific and technical publications, library and documentation services and visual media. It must be expected that mechanization will play an important role in the collection, interpretation, retrieval and dissemination of information, and that INIS, which will be the subject of a pilot study during 1968, will expand and will heavily rely on adequate computer services. The latter will, however, provide support for other services also. The present programme section is broken down into the following sub-headings, which show the different services involved:

(a) Director's office;

(b) INIS;

(c) Computer services;

(d) Publications;

(e) Library; and

(f) Public information and visual media.

INIS

526. The nature and objectives of INIS were described in detail in the Agency's Budget for 1968 [19]; the exploratory work carried out during 1967 will be extended through 1968 by a pilot scheme and system study so that by 1969, when the number of countries actively participating in the experimental work will have increased to between six and eight, planning of the output services could begin.

527. During 1969, it is expected that final decisions can be taken concerning the full implementation of the proposed system and, for the purpose of forecasting likely developments, it is assumed that these decisions will be positive. To begin with, the printed output by the Agency itself would be rather small; decisions on further productions, including an abstracting journal, will have to be made later in the light of developments and demand. Collaboration with other international and regional bodies such as UNESCO and EURATOM will be intensified.

528. During 1969, it is proposed to convene a symposium on nuclear information handling, a regional seminar on preparation of input for INIS and a panel on technical aspects of the system.

529. In order to meet the rising demand for microfiches, the clearing-house activities will be stepped up. The clearing-house will attempt to collect documentation from scientific centres throughout the world and to provide a quick service.

530. The manual preparation of bibliographies will be scaled down, but some - particularly those of an interdisciplinary character - will be continued. Publication of the Atomic Energy Review and the Nuclear Fusion Journal will also be continued but consideration will be given to enlarging the range of topics; in particular, it is hoped to increase the frequency of publication of the Atomic Energy Review and to use it as a means of reporting on the scientific work of the Agency. There will also be close collaboration with the ENEA Computer Programme Library.

531. The year 1970 will mark the beginning of the full operation of INIS. The routine work of collecting and disseminating information will be augmented by such tasks as improvement of the Thesaurus and achieving computer compatibility. Assistance will be given to developing countries in order to improve their input and enable them to become participating countries. Clearing-house operations will increase.

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[19] GC(XI)/360/Annex III.

532. In 1970, it is expected that two panel meetings, one study group and one regional seminar on various subjects connected with the system will be organized, and that by then the preparation of bibliographies will be computerized to a large extent.

533. With regard to likely programme trends beyond 1970 and through 1974, only very broad indications can be given at this stage. By 1971, the greater part of the organizational work connected with INIS will be completed and no large increases in staff or expenditure need be envisaged.

Computer services

534. It is expected that by 1969 the central computer service will be fully staffed to provide support to all Departments of the Agency. This service will be of three types:

(a) Computer operation;

(b) Data preparation; and

(c) Systems analysis and programming.

The latter will be further sub-divided into four branches:

(a) Systems programming, to provide programming advice, develop new software, maintain the Programme Library and maintain software supplied by manufacturers;

(b) Numerical programming, to develop such scientifically-oriented systems as may be needed by the different Departments concerned with scientific research;

(c) Commercial programming, to develop a total administrative system including accounting, stock control, personnel files and a more sophisticated payroll programme than the present one; and

(d) Non-numerical programming, to develop information storage and retrieval systems and other related programmes and such systems as may be required by the expansion of INIS.

535. The service will operate on an open-shop basis as far as programming is concerned; this means that, where special programming skills are not required, scientists will write and submit their own programmes for computer processing. These are expected to be written in advanced programming languages such as FORTRAN or PL/1. The data preparation and computer operation will, on the other hand, be carried out only by specialized staff. The possibility of transferring staff from other Departments now engaged full-time in data processing work will have to be considered so that their work can be better co-ordinated with the computer services programming staff. Since an increased work-load may be expected to result from co-operation with UNIDO in data processing activities, the possible assignment of some UNIDO staff to the Agency's computer services might be considered.

536. During 1969, the problems involved in the conversion to a new model (IBM-360) computer will add somewhat to the work-load. It is expected that the operation of the IBM-360 computer will not become normalized until the end of 1969 or the beginning of 1970, because of the time required for conversion. From this point on, the work-load will be gradually increasing.

537. In planning computer work for 1971-1972, account is taken of the fact that the IBM-360 configuration will be sufficient to meet the Agency's computing requirements for the period 1969-1970. It is planned, however, to develop new and exploit existing reactor

codes which require lengthy computations. This might require in 1971 the expansion of the core storage of the computer. To do this, it would be necessary to exchange the central processing unit (model 360/30) for a model 360/40, since the proposed configuration already includes the maximum core storage for the model 360/30.

538. Depending on the increase in the work-load of the computer, it might also be necessary towards the end of 1971 to rent some additional peripheral equipment for input/output operations and perhaps two new tape units. It is also estimated that an additional keypunch will be needed in 1971.

539. Looking ahead to the years 1973-1974, it seems clear that, if the work-load increases as expected, the IBM-360 computer will be operating on a two-shift basis by 1974.

Publications

540. The full utilization of staff and funds available in 1967 made it possible to achieve a publications volume totalling 27 000 printed pages at an average print-run of 2500 copies. The processing of a number of manuscripts meriting publication had, however, to be deferred to 1968 since the editing and printing capacity was not quite large enough. It is expected that, with the use of some increased revenues in 1968, not only the 1968 programme but also the publications work-load left over from 1967 can be dealt with so that the 1968 output may increase to 29 000 or 30 000 pages. It is expected that the 1969 publications programme may have to cope with 32 000 printed pages.

541. Apart from the routine production of books and journals, a study on two subjects will have to be undertaken: one on the development of new printing and typesetting methods (computer composition) and, in relation to it, the second study will deal with the printing facilities to be established later in the Donaupark area, possibly in co-operation with UNIDO. Visits to printing plants in the United Kingdom and the United States which already employ the computer typesetting method will be useful.

542. In 1970, the two above-mentioned studies will take more time than in the preceding year and, in order to allow for this, it is planned to keep production in that year to the 1969 level. The use of a new IBM composing machine should at this time make some economies possible in 1970 provided it does not entail too great a falling-off in the desirable printing quality. An external computer composition project might be launched as a pilot project.

543. By 1971-1972, the record of sales of Agency publications over the years 1966 to 1970 will have shown whether the forecasts of revenues expected from a regular output of around 30 000 pages are reliable.

Library

544. The Agency's Library will continue to lend books and documents and provide background information to users in Member States and to Agency staff.

545. The activities planned for 1969 are as follows:

(a) Normal library services will continue to be offered including reference services and the circulation of books, films, journals and documents;

(b) Mechanization of some of the clerical operations, particularly circulation control and serial check-in, should be completed during this period so that the clerical work will be handled on the Agency's computer;

(c) Extensive planning, with the possible aid of consultants, should be under way for the new library quarters at the Donaupark; and

(d) All of the Library's publications, including "New Books in the IAEA Library", as well as catalogue cards, should be produced by computer.

546. The activities planned for 1971-1972 are as follows:

(a) Normal library services will continue to be offered including reference services and the circulation of books, films, journals and documents;

(b) Additional mechanization of clerical activity will continue and by that time should be applied to acquisitions; and

(c) Efforts should be under way to establish some sort of automatic system for selection and dissemination of information (SDI) for routing of library material to staff members.

547. By 1973-1974, all of the Library's clerical activities should be mechanized, some sort of SDI service should be offered to the Library's users, a regular training programme should be under way, and the Library's regular services would be continued.

Public information and visual media

548. Public information and visual media activities will have to follow, in 1969-1974, the trend of development in major Agency undertakings. The objective is to provide the public with information in order to create an understanding of what the Agency is undertaking as a result of decisions of its governing bodies.

549. Press and audio-visual coverage is difficult to plan in detail several years in advance. Broadly speaking the activities will, however, follow the outlines indicated in paragraphs 550 to 557 below.

Press

550. The IAEA Bulletin, the main vehicle - together with press releases - for communicating the Agency's message to the general public, should become a monthly publication not later than 1972. Increasing programme activities will provide so much information material that the present six issues a year will no longer be adequate. The series of popularized science articles will be continued and developed. It is also expected that the activities of the Department of Safeguards and Inspection will expand considerably which, in turn, will increase public information needs with regard to both press and audio-visual media.

551. Production of leaflets and booklets of general interest should be accelerated on such subjects as: reactor siting and safety aspects; hydrology; desalting; nuclear energy in food production; radioisotopes in medicine and in industry; technical assistance to developing countries; and the Agency as a world-wide clearing-house for nuclear knowledge and information.

Photographs

552. Increased emphasis should be placed on adequate photo coverage, both in colour and black and white, of the Agency's field activities. Posters, picture stories and television programmes based on still photos should become a regular part of the Agency's general activities in this area.

Radio

553. During the past two years film and television work has absorbed most of the time of the radio/film/television section, and the radio services have been reduced to the very minimum. This situation will prevail until the section is adequately staffed. The subjects

proposed for extensive coverage by press, film and television activities would, however, also be perfectly suitable for selective radio programmes.

Visual media and exhibits

554. In the coming years visual media and exhibits will have developed into one of the most powerful instruments for explaining the Agency's activities. The tremendously increased use of films and television programmes, particularly following on the introduction of colour television in more and more countries, may require additional funds for equipment, technical services and staff.

555. Quite a few of the subjects mentioned in paragraphs 550 and 551 above would be suitable for films and television programmes in the years 1969-1974. In addition, such items as the impact and possibilities of nuclear fusion, the use of nuclear energy in outer space and the "new look" in developing countries as a result of sustained assistance by the Agency with regard to nuclear energy could be selected as subjects for films.

556. Large exhibitions would probably require more funds than the Agency could afford; it should, however, try to present limited exhibitions at Agency conferences, symposia and other meetings. An additional effort will have to be made to show the work of the Agency at the United Nations pavilion at the Osaka World Fair in 1970.

557. The Division of Public Information is obliged to follow the Agency's general programme of activities and these, together with future trends and developments, should be reflected in its operations.

558. The breakdown of the 1968 manning table by individual activities is shown in Table 25 below:

Table 25

Organization unit	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	TOTAL
Division of Scientific and Technical Information										
Office of the Director	1	-	-	1	-	-	2	2	-	4
INIS	-	1	6	4	-	1	12	19	-	31
Computer services	-	1	-	-	2	1	4	3	-	7
Library	-	1	-	1	1	3	6	13	-	19
Editorial and Publications (excluding Publications Programme)	-	1	1	3	2	7	14	6	-	20
Sub-total	1	4	7	9	5	12	38	43	-	81
Publications programme										
Editorial and Publications	-	-	-	-	-	-	-	19	-	19
Documents services	-	-	-	-	-	-	-	12	9	21
Sub-total	-	-	-	-	-	-	-	31	9	40
Division of Public Information	-	1	2	1	1	-	5	6	-	11
TOTAL	1	5	9	10	6	12	43	30	9	132

559. The breakdown of the total costs by individual activities is shown in Table 26 below:

Table 26

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Division of Scientific and Technical Information						
Office of the Director	49 627	50 500	5 800	56 300	500	56 800
INIS	203 403	291 800	62 000	353 800	70 100	423 900
Computer services	151 965	294 300	120 900	415 200	6 000	421 200
Library	174 123	185 000	(6 900)	178 100	6 200	184 300
Editorial and Publications	291 254	342 700	3 100	345 800	30 100	375 900
Division of Public Information	152 627	144 600	7 400	152 000	15 100	167 100
TOTAL	1 022 999	1 308 900	192 300	1 501 200	128 000	1 629 200

Explanation of cost changes (1968/1969)

560. As shown in Table 24 above, it is expected that costs will increase by 14.69% in 1969 over the approved budget for 1968. The explanations of major increases are as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$575 700	$670 700	$95 000 = 16.50%
Common staff costs	$217 100	$254 500	$37 400 = 17.23%

561. The increased level of salaries and wages and common staff costs in 1969 is due to a post adjustment for 43 Professional staff members, salary and wage increases in 1968 for 80 GS and 9 M&O staff members, the additional costs entailed in the recruitment of two additional P-3 staff members for INIS and two new P-2 staff members for the computer, the upgrading of one P-1 post to the P-2 level and two new GS posts, as shown in the manning table in Annex II and explained under Section 6 of the Regular Budget [20].

	1968 budget	1969 estimate	Increase in 1969
All other costs	$516 100	$576 000	$59 900 = 11.61%

562. The changes occurring in various items between 1968 and 1969 are briefly explained below:

(a) Panels and committees. A reduction of $6500 is expected because the 1968 programme provides funds for two INIS panel meetings, whereas only one is planned for 1969;

[20] See para. 667.

(b) Seminars, symposia and conferences. The 1968 budget provides no funds under this Appropriation Section for this programme. In 1969, however, it is expected that one seminar, one symposium and one study group will be held, as listed in the Regular Budget under Appropriation Section 3 [21];

(c) It is expected that increased revenues will permit a reduction of $10 000 in the net costs of the Publications programme;

(d) Scientific and technical services. Since INIS development work will be largely based on computer technology, a variety of work calling for specialized skills will be involved, which could best be carried out by external organizations working under research and development contracts. For this purpose in 1969 a provision of $44 000 is proposed. This will probably be spent on research into the computer hardware and software requirements to ensure compatibility between computer systems in different parts of the world. In 1970 the preliminary estimate is increased to $77 000, on the assumption that by then it may appear feasible to develop a programming language and compilers that will permit documentalists to communicate directly with the computer systems. The possibility of introducing an optical reader is under consideration;

(e) Representation and hospitality. A small increase is proposed to provide hospitality in respect of seminars and symposia and meetings relating to INIS; and

(f) Common services, equipment and supplies. The $22 000 increase under this item in 1969 and the decrease in 1970 are attributable to the changeover from the IBM-1401 to the IBM-360/30 computer, as explained under Section 10 of the Regular Budget [18], and to a $5000 increase in 1969 for public information equipment, supplies and miscellaneous expenses. This increase closely reflects the actual cost experience in 1967 for contractual news agency services, photographic services, non-technical periodicals and newspapers, radio tapes and raw film stocks, and mailing costs for press releases, television, films and radio tapes.

11. SAFEGUARDS

Summary of costs

Table 27

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	220 214	310 900	164 800	475 700	158 100	633 800
Common staff costs	84 869	123 300	60 500	183 800	57 300	241 100
Panels and committees	6 104	6 000	7 000	13 000	-	13 000
Scientific and technical services	107 884	95 000	55 000	150 000	50 000	200 000
Duty travel and missions	61 358	96 400	-	96 400	44 500	140 900
Representation and hospitality	2 963	2 700	300	3 000	500	3 500
TOTAL	483 392	634 300	287 600 45.34%	921 900	310 400 33.67%	1 232 300

[21] See paras 648 and 650.

Programme

General

563. This part of the programme covers all the work of the Department of Safeguards and Inspection, including the Office of the Inspector General. Because of the rapidly expanding utilization of nuclear facilities by Member States, the importance of the Agency's statutory role in safeguards is increasing at a higher rate than any other activity of the Agency. The Agency has statutory safeguards responsibilities which in recent years have been growing at a fast rate, and a further rapid expansion must be foreseen for the six-year period 1969-1974. The Treaty for the Prohibition of Nuclear Weapons in Latin America will increase the scope of the Agency's safeguards activities in that region. It is likely that Member States will continue to transfer the responsibility for administering safeguards in relation to bilateral agreements to the Agency. Furthermore, new facilities are being constructed, which will be under Agency safeguards according to agreements now in force, virgin materials will accumulate, as will produced materials, and material will be transferred between States and continue to be subject to Agency safeguards.

564. The impact of the Treaty on the Non-Proliferation of Nuclear Weapons has not been taken into account in the present programme. It is, however, probable that, during the period in question, the Agency's safeguards responsibilities may be extended to some additional non-nuclear weapons States in which nuclear programmes are pursued, and the present plans are based on this assumption.

565. The following assessment of needs is based on the best available information concerning nuclear installations (the whole nuclear system complex) in operation, under construction, and planned in the countries concerned. This information is fairly precise in relation to the first few years of the six-year period but, except for power reactors, incomplete for later years. It is obvious from this assessment that, without taking into account a general international agreement on non-proliferation, the Agency's safeguards responsibilities are still likely to increase considerably.

566. Special emphasis has to be placed on activities concerned with research on and development of safeguards techniques, and on training of new staff. The present estimate of the need for staff and funds is to some extent tentative, especially with regard to the later years in the period. As the mechanism for submission of a State's nuclear facilities to safeguards involves a certain time lag for negotiation and discussion, even fairly major future changes in the Agency's safeguards task may be accommodated by gradual adjustment of staff requirements. The present programme would allow for the necessary training of new staff by providing for a nucleus of senior Professional staff members.

567. The Agency's safeguards tasks encompass the following three main areas of work:

(a) Implementation, that is to say, the safeguards operation itself, which includes inspection, the analysis of reports and the elaboration of practices for individual facilities already under Agency safeguards;

(b) Basic development, which includes the review and co-ordination of research and development work on technical devices and methods to serve in safeguarding various categories of facilities, the initiation and administration of contractual work in this area, the elaboration of general practices for the conduct of inspections and the formulation of basic requirements for the application of the relevant safeguards; and

(c) Administration, which includes the establishment and maintenance of records and accounts, the planning and preparation of inspection travel, the administrative management of field and Headquarters operations, negotiation and consultation with the authorities of States concerned, and the codification of technical procedures and administrative directives.

568. These tasks are mainly being handled by the Department of Safeguards and Inspection but a determined effort is being made to utilize experience and competence available elsewhere within the Secretariat, e.g. by drawing on normal supporting services in the Department of Administration and on specialized services in the Legal Division, the Division of Nuclear Power and Reactors and the Division of Research and Laboratories.

569. The work-load in the first of the three areas - implementation - is directly related to the number and nature of facilities under safeguards and the quantity of safeguarded material contained in them. The elaboration of operational practices, which is considered under this heading, accounts for an increasingly large share of the work. This activity, together with the other Headquarters operations in the area of implementation (particularly the analysis of accountability and operating reports), accounts for approximately twice the work-load that is involved in the field operation proper.

570. The magnitude of the development task is not directly related to the operational functions. It is, in fact, highly desirable that research on and the development of safeguards methods and devices should precede as far as possible the assumption of safeguards responsibilities to which these pertain, so as to form an adequate basis for future operations. A limited amount of development work is being done within the Agency, but most of it is carried out elsewhere, under contract or independently, by interested parties which allow the Secretariat to acquaint itself with the results of their work. The Secretariat's effort is therefore at present mostly limited to the preparation and administration of research and development projects, the review of work done elsewhere, the testing of instruments for safeguards purposes and the organization of meetings to exchange experience. A list follows of the subjects on which the Secretariat considers it essential that work should be done:

(a) Development of safeguards methods for various types of facilities (Magnox reactors; pressurized-water power reactors and boiling-water reactors; heavy-water reactors; research reactors; test reactors; fast critical assemblies; chemical reprocessing plants; fuel fabrication plants; plants for handling and storing bulk materials);

(b) Verification of integrated thermal power in reactors through various devices and methods;

(c) Analysis of uranium burn-up and plutonium build-up in power reactors (Magnox reactors; pressurized-water power reactors and boiling-water reactors; heavy-water reactors; advanced gas-cooled reactors) and research reactors;

(d) Verification of nuclear fuel movements through facilities (charge-discharge monitoring of continuously refuelled reactors);

(e) Sealing techniques;

(f) Non-destructive verification of unirradiated fuel (development of instruments for the measurement of uranium enrichment in fueld elements and of plutonium content in reactor coupons, etc.);

(g) Non-destructive verification of irradiated fuel inventories;

(h) Systems analysis and statistical aspects of safeguards controls;

(i) Studies of the distribution of uranium burn-up and plutonium build-up throughout reactor cores;

(j) Destructive analysis of unirradiated and irradiated fuel samples; and

(k) Safeguards economics and further incidental studies.

The Agency does not have the financial means to pursue studies on all the topics mentioned above. It is therefore highly desirable that national authorities carry out cost-free research on them on behalf of the Agency to a much greater extent than has hitherto been the case, and the present programme is partly based on the assumption that this will occur. [22]

The situation in 1968

571. In analysing the needs for the next two years it is useful to review the staff situation as it is at present, and to see how many people would in fact be needed to carry out all the tasks now facing the Agency in the three main areas of work outlined above. The distinction between these three areas, however, does not mean that each staff member is employed exclusively in one or the other area. With the limited safeguards staff so far available it has been found that greater efficiency is achieved if each individual undertakes both implementation and developmental tasks, although the emphasis may vary from one person to another. The application of safeguards in the field also involves some administrative elements, such as the negotiation of arrangements for the maintenance of records and the preparation of reports by national authorities.

572. About one third of the present implementation work-load consists of inspections and of preparations for and reporting on such inspections. It is hoped that in 1968 about 90 inspections and pre-operational visits can be carried out (taking an inspection to mean a single visit to a facility). In 1968 the maximum frequency of routine inspections permitted in connection with reactors alone is just under 100. Also, there is safeguarded material at various other locations, including from time to time a large chemical reprocessing plant and research and development facilities. Depending on the amount of material at any of these, it is estimated that the number of routine inspections permitted for facilities other than reactors is about 40, so that the total is 140. Of the 90 inspections that may be carried out, 65 will require about a week each (including preparation and reporting): in about half of these, i.e. 33 inspections, a second inspector should participate, mainly for training purposes. The remaining 25 inspections, mostly of larger or complicated facilities, will require an average of three weeks each, including preparation and reporting. These larger facilities normally demand two inspectors for adequate coverage. Experience has shown that, at least at this stage, about twice as much time as is spent in the field is devoted at Headquarters to the remainder of the implementation work (analysis of reports and associated functions and, in particular, the elaboration of operational practices for individual facilities).

573. The effort in the area of research and development, along the lines set out above, is estimated to take seven man-years, and the administrative work-load adds up to the equivalent of four man-years. One of these is spent on maintaining and developing the records and accounts system, and another on the codification of technical and administrative procedures. The administrative support of and planning for the safeguards operation, at Headquarters and in the field, and the negotiation of technical matters involved in safeguards agreements and consultation on their modes of execution take two more man-years.

574. In addition to the posts needed to deal with the work-load in 1968, it is necessary that there should be four Professional staff members in training during the year, to assume full operational responsibility in 1969. In 1968 the total work-load, including the time spent in training, can thus be estimated to be equivalent to the full-time effort of 29-30 Professional staff members. However, the manning table provides only 20 Professional posts in the Division of Safeguards and Inspection (excluding the two Directors). In view of this shortage of staff, the following apportionment of effort is being made at present:

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[22] In this connection, SAC expressed the opinion at its meeting in January 1968 that the Agency should co-ordinate research and development programmes in Member States and aid in the planning and direction of such work.

for operations - 10 man-years; for development - 2 man-years; for administration - 4 man-years; and for training - 4 man-years. The reductions made will affect the amount of work that can be done on operational and basic development, although it is hoped that some assistance from other Departments may partially make up for this. The personnel policy for the staffing of the Department of Safeguards and Inspection is that of giving two-year contracts on appointment, with the possibility of subsequent extensions of five years depending upon individual performance and the work-load.

Activities proposed for 1969

575. It is expected that in 1969 the nuclear facilities in at least one of the major non-nuclear weapon States will be submitted to Agency safeguards. In two of the States where Agency safeguards are now being applied, a large power station will be completed or will reach a stage of construction demanding the application of safeguards. Under existing agreements safeguards will also have to be applied to pilot-scale fuel fabrication and conversion plants in four States and it is likely that one industrial-sized plant will be under safeguards by late 1968 or early 1969. It is expected that the transfer of the responsibility for administering safeguards with regard to several further research reactors in relation to bilateral agreements with the United States will take place. Planning must also take account of the continuous increase that results from the fact that safeguards are "cumulative": that is, they follow material produced in facilities under safeguards through the various subsequent processes, and the work-load therefore grows even if no new agreements are concluded. In addition, account has to be taken of the increase in the amount of fresh material supplied under existing agreements.

576. The maximum permissible number of routine inspections in 1969 is expected to be of the order of 160, of which about 110 should be carried out. Up to 65 of these are likely to require as little as one week each, and a second inspector should join in about half of them, again largely for training purposes. The remaining 45 inspections will require about three weeks each, a second inspector being involved owing to the complexity of the facilities; as was noted above, about twice as much time as is spent in the field is devoted to implementation work at Headquarters.

577. The research on and development of safeguards methods and devices will continue along essentially the same lines as those described for 1968, with some shifting of priorities, but these activities will need to be further intensified. An increasing number of research contracts will require administration, and prototypes of various safeguards devices will have to be tested and, where necessary, adapted and further developed. Some of the effort of the staff now engaged in basic development as well as in the development of implementation practices for specific types of facilities will have to be devoted to the training of new recruits.

578. The nature of the administrative work in 1969 will be essentially the same as is described above for 1968, but the volume is expected to increase largely as a result of the increased requirements for maintaining and developing the records and accounts system.

579. Besides the posts needed to deal with the work-load in 1969, there should be eight more Professional staff members in training, so that full operational responsibility for the increased tasks foreseen for 1970 can be assumed.

580. Although the methods used to estimate the work-load for 1968 would indicate a considerably higher figure for 1969, the increase requested for that year is held to 10 Professional posts in the interest of economy. Recruitment for these posts and training of the new officers must proceed expeditiously. By continued concentration on implementation, the 30 Professional staff members available should be able to cope with the most important of their tasks. It goes without saying, however, that a considerable number of desirable activities, especially in areas like development, must be deferred. The assistance of Member States in pursuing such work in co-operation with the Agency

and making the results available to the Agency therefore becomes still more urgently needed.

581. It is expected that an increasing part of the implementation work-load will be related to chemical reprocessing and fuel fabrication plants, under circumstances which may call for relatively brief peak periods of work. This might make it possible to supplement the staff of the Department from time to time by using inspectors from other Departments of the Agency. However, the use of such ad hoc inspectors necessitates their prior briefing and training by the regular safeguards staff, and although some peak periods of work can be partially covered by such an arrangement, the total work-load of the staff is not significantly diminished.

582. With the establishment of a second Division, the main activities in the area of basic development will be handled in principle by a limited group of safeguards staff. Nevertheless the practice of allocating to each technical officer both implementation tasks and to some extent also development work, particularly that which is done in direct support of the operation, will continue to be followed. This practice allows the fullest possible use to be made in development of the experience gained in the field, and it also facilitates the concentration of staff at any given time in the area where their efforts are most needed. The new posts are therefore not earmarked for specific areas, although in practice the emphasis in an individual's work will be in one or another of the main areas of activity. In order to provide support and secretarial services required by the Professional staff, five additional GS posts are requested for 1969.

Duty travel

583. The operational responsibilities foreseen for 1969 will involve a heavier frequency of inspections in the Far East, increased activities in Latin America and more inspections in Europe, particularly in Spain and in the Scandinavian area. The total need for safeguards travel funds will be kept at the 1968 level. However, more bulk material handling plants will be covered, and these will be inspected by groups of inspectors for longer periods of time than is required in the inspection of the average nuclear power station. It will be desirable for the staff undergoing training to travel to several nuclear installations in Europe. Later on, they will join inspectors as supernumeraries to acquaint themselves further with safeguards field practices. Therefore every attempt will have to be made to combine trips to the extent possible so as to save on travel expenditure as well as on staff time spent in the field.

Safeguards research and development

584. Contracts up to a value of $90 000 are foreseen for 1969 to further the long-term programme of safeguards technical development. Procurement of instruments and devices, including portable measurement apparatus to be taken on inspections, will cost $40 000; this includes some equipment needed for destructive analysis and sampling operations. A sum of $20 000 is also needed in respect of the equipment and operational expenditures involved in the analysis of samples either at Seibersdorf or at outside umpire laboratories.

Panels and committees

585. In 1969 the Agency will be called upon for the first time to apply safeguards to conversion plants and fabrication plants. In elaborating methods and practices the Secretariat should benefit from the experiences of Member States in this field, and a panel meeting is planned for this purpose. A second panel should discuss systems studies of safeguards applied to nuclear power system complexes to help the Secretariat prepare for the application of safeguards to the entire fuel cycle, which it may soon be called upon to do in several countries. A third panel should deal with safeguards methods and techniques.

Activities proposed for 1970

Staff

586. New power stations to be commissioned in 1970, and conversion, fabrication and reprocessing installations, together with the material that will by then have accumulated, when added to the work-load expected in 1969, will significantly increase the total operational work-load in safeguards in 1970. It is expected that the requirements in 1970 in the area of research and development will remain at approximately the level of the previous year. These requirements will again only be met if Member States make available to the Agency the results of development work they have themselves done in the field.

587. Although the work in the area of administration is again expected to grow somewhat, it is hoped that by 1970 much of it will be routine and can be performed by GS staff. It should be possible to maintain the work-load of Professional staff members at about the level of 1969. It is again essential that some of the operational staff who will be needed in 1971 should be recruited and trained in 1970 to cope with the great increase in safeguards work expected in 1971.

588. It will be necessary to keep the manpower requirements for 1970 under constant review during 1968 and 1969. The present estimate, which must be considered as very prelimimary, includes provision for only 13 Professional and seven GS posts.

Duty travel

589. The frequency of the inspections will increase perceptibly and there will again be more inspections of reprocessing, conversion and fabrication plants, involving teams of inspectors for longer periods. It is possible that the inspection frequency in some parts of the world will make it desirable to outpost inspectors at one or more field offices, from which a range of installations can be covered. This will eventually lead to savings in travel funds, but in the beginning it may involve some outlay for the establishment of such offices. Although the estimate of $140 900 for inspection and other duty travel is almost 50% higher than that for 1969, it is based on the assumption that about the same percentage of the maximum permissible number of routine inspections will be performed as in 1968 and 1969.

Research and development

590. The development work (mainly in the form of contracts) will in 1970 require considerable strengthening, particularly in respect of the analysis of fuel cycle safeguards systems, the development of techniques for verification of nuclear materials and of the operational history of nuclear facilities, and the construction of various verification instruments. An increase of 30% in this item is foreseen, bringing it to $200 000.

Panels

591. It is expected that in 1970 two or three panels will have to be convened to discuss the safeguards methods and techniques for specific facilities for which technical practices have not yet been fully established.

The two-year period 1971-1972

592. Planning for the 1971-1972 two-year period will have to take account of a very large growth in the installed nuclear power capacity in the non-nuclear States; it is now expected that this will be 7000 MW in 1970 and will be more than doubled by 1972, reaching 16 000 MW. There will also be a large increase in the facilities for conversion, fabrication and reprocessing of nuclear materials. It is obvious that the operational staff will have to be increased considerably to cope with this expansion.

593. The developmental work within the Agency during this period would not only consist of the administration of research contracts, but include some staff work in systems analysis, computer applications and the development of safeguards techniques, which might relate to available equipment and devices, or the development of analytical techniques to be employed, for example, by inspectors or accounting staff. The programme takes into account the large-scale research assumed to be performed by Member States.

594. Another important matter will be the development of meaningful safeguards statistics, which are likely to be much in demand.

The two-year period 1973-1974

595. During the two-year period 1973-1974 the steep growth in the installed nuclear power capacity in non-nuclear States is shown by the fact that 16 000 MW will be installed by the end of 1972 and this will increase to 27 000 MW by the end of 1974. The number of other installations in the nuclear fuel cycle (fuel fabrication and reprocessing plants) will also grow considerably both in size and number. It is expected that the operational staff required will again have to be increased, but at a lower rate than the installed power capacity would indicate. Increases in the other personnel branches are expected to be relatively minor. The development work will again have to be increased at about the rate of the preceding period.

Explanation of cost changes (1968/1969)

596. As shown in Table 27 the cost of this programme is expected to increase in 1969 by $281 600 or 45.34% over the 1968 budget level. This increase is based on the addition of ten Professional and five GS posts in 1969. The preliminary estimate for 1970 assumes a further increase of 13 Professional and seven GS posts. The major item of cost increase is therefore for salaries and wages and associated common staff costs as shown below.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$310 900	$475 700	$164 800 = 53.01%
Common staff costs	$123 300	$183 800	$60 500 = 49.0%

597. In addition to the 15 new posts in 1969, for which the justification has been provided in the programme statement, the increase in costs under the items for "Salaries and wages" and "Common staff costs" are partially due to GS and M&O salary increases approved since preparation of the 1968 budget, and a post adjustment for Professional staff approved in 1968 but not included in the 1968 approved budget.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$200 100	$262 400	$62 300 = 31.13%

598. The increase in all other items of expenditure provides for two panels on safeguards subjects in 1969, compared with only one in 1968, an increase of $55 000 for safeguards development under appropriation Section 5, "Scientific and technical services", and a minor increase of $300 for hospitality, reflecting increased costs and the need for more expenditure for this purpose in respect of the expanded programme of safeguards.

D. SERVICE AND SUPPORT ACTIVITIES COMMON TO A NUMBER OF PROGRAMMES

Summary of costs

Table 28

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	490 786	506 100	29 100	535 200	600	535 800
Common staff costs	187 085	199 600	4 300	203 900	200	204 100
Seminars, symposia and conferences	17 808	15 000	3 200	18 200	(3 200)	15 000
Representation and hospitality	132	100	100	200	100	300
TOTAL	695 811	720 800	36 700	757 500	(2 300)	755 200
			5.09%		(0.30%)	

Programme

Highlights

599. It has been possible on the basis of reasonably good work-load statistics to allocate the costs of many service and support activities to specific parts of the programme; there are inevitably some which cannot be so allocated. Rather than resort to a breakdown by relative percentages in cost or personnel, it has seemed preferable to show the costs of such services and activities in a separate group, as has been done for the past two years in the ACC report to ECOSOC.

600. The estimates in this group are made up of the residual costs of such services as are provided by the Division of Languages and the Interpretation Services after a certain part has been allocated to the General Conference and the Board of Governors; further, there are parts of services provided by other Divisions which should not be shown as administrative services since their supporting role does not extend over all activities of the Agency. For example, the Division of Scientific and Technical Information provides co-ordinating and administrative support to the whole programme of scientific conferences, symposia and seminars, and a small section in the Division of Research and Laboratories is administratively responsible for the research contract programme and for the necessary liaison between the research workers and technical and administrative units of the Agency.

Explanation of cost changes (1968/1969)

601. The greater part of the costs shown in Table 28 above arise from salaries and allowances of 39 Professional and 31 GS staff members assigned to research contract administration (4 posts), scientific conference administration (7 posts), translation (49 posts) and interpretation services (10 posts). These costs are made up as follows:

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$506 100	$535 200	$29 100 = 5.75%
Common staff costs	$199 600	$203 900	$ 4 300 = 2.15%

602. No increase in staff for these services is planned for 1969. Therefore, the entire increase in salaries and associated common staff costs is due to the post adjustment for Professional staff and salary and wage increases for GS staff in 1968 which are not provided for in the budget for that year.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$15 100	$18 4000	$3 300 = 21.85%

603. Except for a minor allowance for hospitality all remaining costs relate to minor general administrative expenses in respect of scientific conferences and to the financial grant-in-aid given to non-Agency meetings which are of scientific interest to the Agency. Based on actual experience in 1967, it is planned to allow for an increase in such costs by $3200.

E. ADMINISTRATIVE SERVICES

1. ADMINISTRATION

Summary of costs

Table 29

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	709 054	718 800	37 200	756 000	26 400	782 400
Common staff costs	265 688	274 100	7 800	281 900	8 500	290 400
Panels and committees	-	8 000	(8 000)	-	6 500	6 500
Seminars, symposia and conferences	490	1 000	(1 000)	-	5 500	5 500
uty travel and missions	17 000	22 600	(2 200)	20 400	500	20 900
Representation and hospitality	7 561	7 300	400	7 700	900	8 600
Common services, equipment and supplies	25 115	30 000	(3 000)	27 000	2 000	29 000
TOTAL	1 024 908	1 061 800	31 200 2.94%	1 093 000	50 300 4.60%	1 143 300

Programme

Highlights

604. This part of the programme covers the specific work of the Office of the Deputy Director General for Administration, the Office of Internal Audit, the Division of Budget and Finance, the Division of External Liaison and Protocol, the Legal Division, and the Division

of Personnel. These six units perform the functions which are indicated by their titles and have 45 Professional and 57 GS staff members. In 1969 the only proposed staff changes in these units are a reclassification of the Medical Officer in the Division of Personnel from P-4 to P-5 grade and the addition of one GS post for a finance clerk in the Division of Budget and Finance. The increase in costs is almost entirely due to salary and price increases plus these minor increases in personnel. The preliminary estimate for 1970 provides for an additional increase of two Professional and four GS posts.

General

605. The work of the various units concerned cannot conveniently be broken down into annual programmes, except that of the Legal Division (see paras 609-611 below). They carry out general administrative and fiscal duties, the nature of which is fairly strictly prescribed by existing administrative regulations and rules or is determined by contracts and agreements. The volume of work involved, however, increases as the overall programme of work of the Agency expands. The responsibilities and functions of the different units are briefly described in the paragraphs which follow.

Office of Internal Audit

606. The Office of Internal Audit is responsible for the review of the Agency's financial and other transactions to ensure the regularity of the receipt, custody and disposal of all funds and other financial resources of the Agency as well as the conformity of obligations and expenditures with budgetary appropriations and with the financial rules and regulations. It advises the Director General on the most economic use of the resources of the Agency.

Division of Budget and Finance

607. The Division of Budget and Finance provides financial services for the Agency, controls receipts and financial disbursements, prepares annual budgetary estimates and financial plans and advises the Director General on all fiscal matters.

Division of External Liaison and Protocol

608. The Division of External Liaison and Protocol is responsible for liaison with Member States, the United Nations, the specialized agencies and other inter-governmental and non-governmental organizations of an international character. It also maintains liaison with the Host Government and advises on questions arising from the agreements concluded with it. It arranges and co-ordinates Agency representation at meetings of the United Nations and other international bodies and deals with protocol questions, particularly in connection with sessions of the General Conference; it compiles periodic reports to the General Conference, the Board and the relevant organs of the United Nations. It advises the Director General on matters of external relations.

Legal Division

609. The Legal Division not only assists in the internal administration of the Agency but also in the preparation of legal instruments connected with such activities as safeguards, reactor projects, health and safety measures and technical assistance. Accordingly a large part of the Division's work is connected with the activities of other Divisions. As a separate and distinct responsibility the Division is also assisting Member States in the development of nuclear legislation and promoting a world-wide harmonization in this field. The Agency must take the lead in this development so as to ensure that nuclear law keeps pace with the continuous evolution of nuclear activities.

610. Matters of international significance which require attention are liability for nuclear damage and insurance, the legal aspects of food irradiation, the safe transport of nuclear materials, the control of radioactive waste disposal, etc. It is expected that developing

countries will continue to require advice and assistance in the preparation of appropriate legislation, and that some questions in the field of nuclear law which call for harmonization will have to be dealt with. From the wide participation in the legal training course held in 1968, it seems obvious that the training of lawyers associated with national programmes on nuclear energy is becoming increasingly important and will constitute a substantial part of the Division's activities.

611. It is expected that during 1969-1970 panels on nuclear insurance and on the legal aspects of licensing nuclear activities may have to be convened. It is planned to hold seminars on the development of nuclear law at two-yearly intervals, beginning in 1970. In addition, it is expected that the third session of the Standing Committee on Civil Liability for Nuclear Damage will be held in 1970 and that by 1973-1974 an international conference on the revision of the Vienna Convention on Civil Liability may be required.

Division of Personnel

612. The Division of Personnel is responsible for the administration of the Agency's Provisional Staff Regulations and Staff Rules, for carrying out its personnel policies and for the review and development of new policies as appropriate. It recruits the staff of the Agency in consultation with the heads of Departments. It also advises the Director General on points of personnel administration that arise within the United Nations system.

Explanation of cost changes (1968/1969)

613. As shown in Table 29 above, costs in 1969 increase by only $31 200 over the 1968 budget. However, since the total costs are over $1 million per year, it is appropriate to explain in somewhat more detail the components of cost which are charged under this heading.

614. The staffing of the units involved is shown in the manning table; Table 30 below summarizes the approved 1968 manning table for the staff charged to this part of the programme.

Table 30

Organization unit	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	Total
Office of Deputy Director General for Administration	1	-	1	-	1	-	-	3	2	5
Office of Internal Audit	-	-	1	-	1	-	1	3	2	5
Division of Budget and Finance	-	1	2	4	3	2	5	17	22	39
Division of External Liaison and Protocol	-	2	4	1	-	1	-	8	10	18
Legal Division	-	1	2	2	1	1	-	7	5	12
Division of Personnel	-	1	1	3	1	1	-	7	16	23
TOTAL	1	5	11	10	7	5	6	45	57	102

615. The total costs by the various organizational units are shown below.

Table 31

Organization unit	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Office of Deputy Director General for Administration	65 689	80 500	1 200	81 700	600	82 300
Office of Internal Audit	51 082	50 800	1 100	51 900	300	52 200
Division of Budget and Finance	343 824	361 400	14 200	375 600	12 900	388 500
Division of External Liaison and Protocol	243 075	221 200	10 400	231 600	2 000	233 600
Legal Division	122 940	155 700	(5 700)	150 000	31 200	181 200
Division of Personnel	198 298	192 200	10 000	202 200	3 300	205 500
TOTAL	1 024 908	1 061 800	31 200	1 093 000	50 300	1 143 300

616. The major cost increases in 1969 by object of expenditure are shown below.

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$718 800	$756 000	$37 200 = 5.17%
Common staff costs	$274 100	$281 900	$ 7 800 = 2.85%

617. The 1969 budget includes an increase of about $31 500 for salary increases for the GS and M&O staff and for a post adjustment for Professional staff, $2380 for the reclassification of the Medical Officer in the Division of Personnel from P-4 to P-5 as indicated in paragraph 604 above, and $3325 for an additional finance clerk in the Division of Budget and Finance. The increased common staff costs are attributable to these salary increases and to the staffing changes.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$68 900	$57 100	($13 800) = (20.03%)

618. The reduction of $13 800 in all other items of expenditure results from the reduction of meetings on legal subjects and reduced requirements in respect of "Common services, equipment and supplies" under the sub-item for insurance and bank charges. This reduction has been achieved by consolidation of insurance policies after expiration of certain ten-year contracts and by wider competitive bidding.

2. COMMON SERVICES

Summary of costs

Table 32

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Salaries and wages	510 002	531 400	56 400	587 800	26 600	614 400
Common staff costs	184 246	202 500	22 700	225 200	6 900	232 100
Duty travel and missions	383	500	-	500	100	600
Representation and hospitality	30	100	-	100	200	300
Common services, equipment and supplies	484 337	492 000	(7 500)	484 500	22 500	507 000
TOTAL	1 178 998	1 226 500	71 600 5.84%	1 298 100	56 300 4.34%	1 354 400

Programme

Highlights

619. This part of the programme includes most of the work and related costs of the Division of Conference and General Services, excluding only that portion of Documents Service costs charged to the programmes for policy-making organs and information and technical services. The functions performed by this Division are conference co-ordination services; engineering and maintenance services for the entire Secretariat, including electronics servicing of simultaneous interpretation facilities, building maintenance, guard service, and cleaning staff; documents services, including photoplate work, mimeo and offset printing, and documents distribution and sales; purchase and transportation services; and registry, files, archives and messenger services. Employed in this Division in 1968 are 11 Professional, 60 GS and 106 M&O staff members. In 1969 it is proposed to add two GS posts because of the increased work-load.

Explanation of cost changes (1968/1969)

	1968 budget	1969 estimate	Increase in 1969
Salaries and wages	$531 400	$587 800	$56 400 = 10.61%
Common staff costs	$202 500	$225 200	$22 700 = 11.21%

620. The increase of $56 400 under "Salaries and wages" in 1969 is largely due to the increases in emoluments granted to GS and M&O staff during the past two years. The average cost of a GS post per year in the 1968 budget was $3000, whereas it is necessary to provide for an average cost of $3325 in 1969. For the 67 posts involved this represents a total increase of $22 277. Similarly, the average cost of an M&O post increases from $1710 to $1950 per year which, for 102 posts, amounts to $24 480. The one new GS post proposed

for 1969 adds another $3325 to the salary costs. The balance of approximately $6300 is due to the post adjustment for Professional staff members and to the increases in within-grade increments.

	1968 budget	1969 estimate	Increase in 1969
All other costs	$492 600	$485 100	($7500) = (1.52%)

621. The items to which the above costs relate are those covered by Appropriation Section 10, Common services, equipment and supplies[23], except costs in respect of the computer and insurance and bank charges, and a small amount for public information supplies and equipment. The proposed increase of $7500 during 1969 mainly results from a reduction of $16 000 in the costs of rental, alterations and maintenance of premises and equipment and a reduction of $12 000 for office machines and equipment, largely offset by the increased cost of communications and services and supplies, as explained in the budget. No changes are proposed for travel and hospitality.

F. OTHER BUDGETARY PROVISIONS

Summary of costs

Table 33

Item of expenditure	Actual 1967 obligations $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $	Increase or (decrease) 1969/1970 $	Preliminary 1970 estimate $
Contingent extraordinary expenditures	-	130 000	-	130 000	20 000	150 000

622. In accordance with a recommendation of the General Assembly's Ad Hoc Committee [24], the Agency's budget for 1968 provided, for the first time, for an appropriation of $130 000 for possible use to meet extraordinary unforeseen expenditures. It now appears likely that a large portion, if not all, of this appropriation will be required to finance a post adjustment for Professional staff and general salary increases for GS and M&O staff members. Accordingly, and in view of the fact that cost-of-living and salary index figures for Vienna indicate that in all probability there will be a further need for similar increases in emoluments of staff during 1969 and 1970, it is proposed to retain the provision of $130 000 for 1969, but to increase it to $150 000 for 1970.

623. Funds appropriated for this purpose may only be used with the specific prior approval of the Board, in accordance with the wording of the appropriation resolution in Annex III.

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[23] See Table 55.

[24] United Nations document A/6343, para. 41.

III. THE BUDGET FOR 1969

A. FOREWORD

I. GENERAL

624. In accordance with Article XIV.A of the Statute, the Board of Governors hereby submits to the General Conference the budget estimates for the expenses of the Agency in 1969. These estimates were initially prepared by the Director General, reviewed by the Board's Administrative and Budgetary Committee in April 1968 and finally adopted by the Board in June 1968.

625. The estimates for 1969 are based on the requirements for the first year of the biennial programme for 1969-1970. Throughout the programme document preliminary estimates have also been included for 1970. These estimates, expressed in terms of Appropriation Sections of the Regular Budget, are shown in Table 34 below, which indicates that the estimated two-year programme will cost approximately $23 425 000, of which about $22 650 000 will represent assessments on Member States.

(b) Revision of the manning table, which is presented in the form of organization charts showing for each Division the manning table for the past two years compared with the requested manning table for 1969 and includes the entire manning table under the Regular Budget without showing separate manning tables for the Agency's Laboratory at Seibersdorf, the Monaco Laboratory and the Trieste Centre as was done in the past; and

(c) An attempt has been made to meet one of the Ad Hoc Committee's recommendations by including an annex showing total costs broken down into sub-headings for administrative costs, operational costs, and general research and study costs.

The Regular Budget

630. As indicated in the introduction to the programme[26], the presentation of the Regular Budget Appropriation Sections has been revised as follows:

(a) The former Appropriation Sections for the General Conference and the Board of Governors have been combined into one Section entitled "Policy-making organs". This title conforms with the classification used by ACC in its reports to ECOSOC;

(b) Because of the relatively small expenditures in the past, the Appropriation Section for Special missions is combined with that for Duty travel of staff and appears as a sub-item in that Section; and

(c) The former Appropriation Section entitled "Scientific and technical services and laboratory charges" has been divided into two new Sections entitled "Scientific and technical services", which includes research contracts, safeguards development, technical contracts, and health and safety services and "Operational facilities", which includes the costs borne by the Regular Budget for the Seibersdorf Laboratory, the Monaco Laboratory, the Trieste Centre and the co-operative programme with FAO. This change is based upon a recommendation by the External Auditor and makes for simplification and a better understanding of the programme components involved.

631. Thus the Regular Budget is broken down into 12 Appropriation Sections, as shown in Table 35 below. In three of these Sections a reduction is proposed and in another three no change is proposed for 1969; in the remaining six increases will be required. The amount and percentage change in each Section is shown in Table 35 below.

632. Of the $774 000 increase in total expenditures proposed for 1969, $451 000 is attributable to increases in prices and salaries or related emoluments of staff; therefore, only $323 000 is attributable to changes in the programme. Some additional price increases are absorbed within Sections for which no increased or reduced appropriations are proposed. The programme changes would have resulted in a 3.6% increase if it had not been for the deduction of the non-recurring item of $50 000 under operational facilities, which more than offsets other programme increases proposed for 1969.

633. The following table shows, for each Appropriation Section for which changes are proposed, the portion attributable to price increases as opposed to programme changes.

[26] See para. 11.

626. In December 1967 a Committee of the Whole of the Board reviewed, with the Director General, tentative estimates for the 1969-1970 Regular Budget. At that time the Director General indicated that the budgetary increases for 1969 and 1970 would be kept to 9% and 8% respectively, excluding possible increases for safeguards research and development. As can be seen from the above table, reductions have been made which keep the increases well below this preliminary estimate. The net increase in assessments on Member States for 1969, including the increase for safeguards research and development, is 7.12%. If the increase for safeguards research and development were excluded, the remaining increase would be about 6.6%. Similarly the increase for 1970, as reflected in the present preliminary estimate, amounts to about 8%, of which approximately 0.5% pertains to safeguards research and development.

627. With regard to the Operational Budget, the Board proposes to maintain the target for voluntary contributions to the General Fund at $2 million for 1969.

II. THE BUDGET FOR 1969

Presentation

628. The structure and presentation of the budget remain essentially the same as in previous years; some of the Regular Budget Appropriation Sections have, however, been consolidated and the explanatory text has been reduced in order to avoid duplication of the detailed financial explanations given in the programme.

629. Some changes in the annexes to the 1969 budget have also been made in order to follow more closely the recommendations of the General Assembly's Ad Hoc Committee of Experts to Examine the Finances of the United Nations and the Specialized Agencies [25]. These changes include:

(a) Revision of the supplementary financial tables, which reflect the estimated cost of the programme in terms of the totals for the appropriation Sections as set forth in the appropriation resolution;

(b) Revision of the manning table, which is presented in the form of organization charts showing for each Division the manning table for the past two years compared with the requested manning table for 1969 and includes the entire manning table under the Regular Budget without showing separate manning tables for the Agency's Laboratory at Seibersdorf, the Monaco Laboratory and the Trieste Centre as was done in the past; and

(c) An attempt has been made to meet one of the Ad Hoc Committee's recommendations by including an annex showing total costs broken down into sub-headings for administrative costs, operational costs, and general research and study costs.

The Regular Budget

630. As indicated in the introduction to the programme[26], the presentation of the Regular Budget Appropriation Sections has been revised as follows:

(a) The former Appropriation Sections for the General Conference and the Board of Governors have been combined into one Section entitled "Policy-making organs". This title conforms with the classification used by ACC in its reports to ECOSOC;

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[25] See United Nations document A/6343.
[26] See para. 11.

(b) Because of the relatively small expenditures in the past, the Appropriation Section for Special missions is combined with that for Duty travel of staff and appears as a sub-item in that Section; and

(c) The former Appropriation Section entitled "Scientific and technical services and laboratory charges" has been divided into two new Sections entitled "Scientific and technical services", which includes research contracts, safeguards development, technical contracts, and health and safety services and "Operational facilities", which includes the costs borne by the Regular Budget for the Seibersdorf Laboratory, the Monaco Laboratory, the Trieste Centre and the co-operative programme with FAO. This change is based upon a recommendation by the External Auditor and makes for simplification and a better understanding of the programme components involved.

631. Thus the Regular Budget is broken down into 12 Appropriation Sections, as shown in Table 35 below. In three of these Sections a reduction is proposed and in another three no change is proposed for 1969; in the remaining six increases will be required. The amount and percentage change in each Section is shown in Table 35 below.

Table 35

Appropriation Section	1968 budget $	1969 estimate $	Increase (decrease) Amount $	Increase (decrease) %
Estimated expenditures:				
1. Policy-making organs	568 500	568 500	-	-
2. Panels and committees	200 000	200 000	-	-
3. Seminars, symposia and conferences	155 000	145 000	(10 000)	(6.45)
4. Distribution of information	216 000	206 000	(10 000)	(4.63)
5. Scientific and technical services	947 000	1 035 000	88 000	9.29
6. Salaries and wages	4 488 500	5 007 000	518 000	11.55
7. Common staff costs	1 699 000	1 877 000	178 000	10.48
8. Duty travel and missions	296 000	276 000	(20 000)	(6.76)
9. Representation and hospitality	35 000	37 000	2 000	5.71
10. Common services, equipment and supplies	779 000	795 500	16 500	2.12
11. Operational facilities	963 000	974 000	11 000	1.14
12. Contingent extraordinary expenditures	130 000	130 000	-	-
Sub-total, expenditures	10 477 000	11 251 000	774 000	7.39
Less: Estimated miscellaneous income				
Allocation from United Nations Special Account	163 500	163 500	-	-
Refunds from the United Nations Joint Staff Pension Fund	-	35 000	35 000	-
Income from investments and other sources	150 000	165 000	15 000	10.0
Sub-total, miscellaneous income	313 500	363 500	50 000	15.94
Net assessment on Member States	10 163 500	10 887 500	724 000	7.12

632. Of the $774 000 increase in total expenditures proposed for 1969, $451 000 is attributable to increases in prices and salaries or related emoluments of staff; therefore, only $323 000 is attributable to changes in the programme. Some additional price increases are absorbed within Sections for which no increased or reduced appropriations are proposed. The programme changes would have resulted in a 3.6% increase if it had not been for the deduction of the non-recurring item of $50 000 under operational facilities, which more than offsets other programme increases proposed for 1969.

633. The following table shows, for each Appropriation Section for which changes are proposed, the portion attributable to price increases as opposed to programme changes.

Table 36

Appropriation Section	Proposed changes for 1969 as compared with 1968		
	Total $	Price increases $	Programme changes $
3. Seminars, symposia and conferences	(10 000)		(10 000)
4. Distribution of information	(10 000)		(10 000)
5. Scientific and technical services	88 000	1 000	87 000
6. Salaries and wages	518 000	310 200	208 300
7. Common staff costs	178 000	88 000	90 000
8. Duty travel and missions	(20 000)		(20 000)
9. Representation and hospitality	2 000	2 000	
10. Common services, equipment and supplies	16 500	9 500	7 000
11. Operational facilities	11 000	40 300	(29 300)
TOTAL	774 000	451 000	323 000
Percentage of 1968 budget	7.4%	4.3%	3.1%

634. The price increases may be broken down as follows:

Post adjustments (Vienna, New York and Monaco)	$144 400
GS and M&O salary increases	158 200
Salary increments	35 800
Common staff costs	97 000
Prices of goods and services	15 600
TOTAL	$451 000

635. The changes relating to the programme are summarized by activities in Table 37 below, with an indication of the percentage change compared with the approved budget for 1968.

Table 37

Activities	Appropriation Section or item of cost	Programme changes		
		$	$	Percentage of 1968 budget
Safeguards (paras 563 to 598 in the programme)	Scientific and technical services (development)	55 000		
	Salaries and wages (10 Professional and 5 GS posts)	126 400		
	Common staff costs	48 000		
Sub-total			229 400	2.2
INIS and computer (paras 526 to 539 in the programme)	Technical contracts (compatibility study)	32 300		
	Salaries and wages (4 Professional and 2 GS posts)	40 000		
	Common staff costs	15 300		
	Computer services	22 000		
Sub-total			109 300	1.0
Nuclear data (paras 194 to 198 in the programme)	Salaries and wages (3 Professional and 1 GS posts)	31 300		
	Common staff costs	11 800		
	Computer services ($12 000 included under computer)	-		
Sub-total			43 100	0.4
Life sciences (paras 121 to 183 in the programme)	Salaries and wages (2 Professional posts)	11 100		
	Common staff costs	4 200		
Sub-total			15 300	0.2
Operational facilities (paras 238 to 319 and 506 to 523 in the programme)	Net reduction in respect of the laboratories		(29 300)	(0.3)
All other			(44 800)	(0.4)
			323 000	3.1

636. The above changes are explained in the paragraphs in the programme to which references are given in the table.

637. As provided in the Statute and the Financial Regulations, the Regular Budget is financed by contributions for which Member States are assessed annually. In accordance

with established practice, the Director General will propose to the General Conference a scale of assessments for 1969 based on the United Nations scale for 1968.

638. The final cash surplus for 1966 which will be allocated to Member States in 1969 amounts to $179 328. This sum is thus available to reduce the assessed contribution for 1969. As a result, the additional assessments on Member States will be reduced to $544 672, which represents only 5.2% of the approved budget for 1968.

The Operational Budget

639. Under the Operational Budget, the proposed allocations for the programme amount to $2 512 000, of which the following sums are expected to be derived from special contributions and miscellaneous income:

Government of Italy	$250 000
Government of Monaco	45 000
Ford Foundation	45 000
Other special contributions	55 000
Laboratory revenues	67 000
Miscellaneous income	50 000
	$512 000

640. This leaves a target sum of $2 million to be met by voluntary contributions by Member States to the General Fund. Unfortunately, the improvement in the sums pledged by the end of the year which the Board referred to in the Budget for 1968 [27], has not continued, as shown by the comparative figures for the past three years which are as follows:

Pledged by 31 December 1965 for 1966	$1 076 000
Pledged by 31 December 1966 for 1967	1 350 000
Pledged by 31 December 1967 for 1968	1 338 000

641. It is unfortunately clear that there will be a persistent shortfall in voluntary contributions and the Board has no reason to believe that an increase in the target would improve the situation; the target for 1969 is therefore maintained at $2 million.

III. THE UNITED NATIONS DEVELOPMENT PROGRAMME

642. Since new programming procedures for the technical assistance component of UNDP have now been introduced, it is not possible to make any forecast in respect of the sums likely to be allocated to the Agency in future years. It is, however, intended to show in the annual budget documents the UNDP funds actually available and used during the preceding year.

IV. THE WORKING CAPITAL FUND

643. The Board proposes that for 1969 the Agency's Working Capital Fund should remain at the same level as before, namely $2 million.

V. SUBMISSION OF THE BUDGET TO THE GENERAL ASSEMBLY OF THE UNITED NATIONS

644. After adoption by the General Conference, and in accordance with Article XVI of the relationship agreement with the United Nations, the Agency's budget will be reviewed by ACABQ, which will report on the administrative aspects thereof to the General Assembly.

[27] GC(XI)/360, para. 21.

B. THE BUDGET

I. THE CONSOLIDATED BUDGET

Table 38

Item	1967 actual $	1968 budget[a] $	1969 estimate $
RECEIPTS			
Regular Budget			
Assessed contributions of Member States	8 516 908[b]	10 163 500	10 887 500
Miscellaneous income	321 068	313 500	363 500
General Fund			
Voluntary contributions	1 441 782	2 000 000	2 000 000
Special contributions	322 898	322 500	350 000
Miscellaneous income	44 046	50 000	50 000
Operating Fund I.			
Unallocated balances brought forward	123 339	-	-
Savings on prior year's operations	4 826	-	-
Income from reimbursable services	48 784	57 500	67 000
Reimbursable research work	5 410	-	-
Miscellaneous income	60 213	105 000	45 000
Operating Fund II.			
Savings on prior year's operations	274 524	-	-
Income from reimbursable services	66 568	pro memoria	-
Miscellaneous income	1 206	-	-
TOTAL	11 231 572[c]	13 012 000	13 763 000
EXPENDITURES			
Regular Budget	9 326 379	10 477 000	11 251 000
Operating Fund I	774 470	692 000	673 000
Operating Fund II	1 619 126	1 843 000[d]	1 839 000[d]
TOTAL	11 719 975[c]	13 012 000	13 763 000

a/ GC(XI)/360.

b/ As at 31 December 1967.

c/ The difference of $488 403 between expenditure and receipts represents the provisional cash deficit for 1967.

d/ Excluding $35 000 for fellowships at the Trieste Centre, transferred to Operating Fund I.

II. REGULAR BUDGET ESTIMATES

A. Summary of expenditures

Table 39

Appropriation section		1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
1.	Policy-making organs	556 321	568 500	-	568 500
2.	Panels and committees	180 350	200 000	-	200 000
3.	Seminars, symposia and conferences	122 269	155 000	(10 000)	145 000
4.	Distribution of information	157 437	216 000	(10 000)	206 000
5.	Scientific and technical services	897 712	947 000	88 000	1 035 000
6.	Salaries and wages	4 126 756	4 488 500	518 500	5 007 000
7.	Common staff costs	1 543 129	1 699 000	178 000	1 877 000
8.	Duty travel and missions	214 872	296 000	(20 000)	276 000
9.	Representation and hospitality	34 576	35 000	2 000	37 000
10.	Common services, equipment and supplies	678 443	779 000	16 500	795 500
11.	Operational facilities	814 514	963 000	11 000	974 000
12.	Contingent extraordinary expenditures	-	130 000	-	130 000
	TOTAL	9 326 379	10 477 000	774 000 7.39%	11 251 000

B. Summary of receipts

Table 40

Item	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Assessed contributions of Member States	8 516 908[a/]	10 163 500	724 000 (7.12%)	10 887 500
Miscellaneous income				
Allocation from the United Nations Special Account	156 824	163 500	-	163 500
Refunds from the United Nations Joint Staff Pension Fund	-	-	35 000	35 000
Income from investments and miscellaneous income	164 244	150 000	15 000	165 000
TOTAL	8 837 976	10 477 000	774 000	11 251 000

a/ As at 31 December 1967.

C. Regular Budget appropriations

Section 1. Policy-making organs

Table 41

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
The General Conference	213 685	224 000	(24 000)	200 000
The Board of Governors	342 636	344 500	24 000	368 500
TOTAL	556 321	568 500	-	568 500

645. This Section represents the budget for the Agency's statutory policy-making organs as explained in paragraphs 32 to 38 in the programme. Although no net increase in the appropriation is proposed, recent work-load analyses and an estimate of requirements in 1969 indicate that some shift in the distribution of costs between the General Conference and the Board of Governors can be expected.

Section 2. Panels and committees

Table 42

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Panels and committees	180 350	200 000	-	200 000

646. No increase is proposed in this appropriation for 1969. The 1968 level will make it possible to meet some increase in expenditure over that for 1967. It is assumed that it will be possible to hold approximately 28-30 panel meetings, one meeting of SAC, one meeting of INDC, and several meetings of committees concerned with the periodic review of co-ordinated research work and other aspects of the programme. In addition, several meetings on subjects related to food and agriculture are expected to be financed by FAO.

647. Within the financial limits of the appropriation, and depending upon the highest priority requirements of the programme, the Director General will select the subjects of panel and other meetings from those listed below.

Panels

(a) Technical assistance

(i) Training of specialists in nuclear science and technology in developing countries (with UNESCO)(para. 50);

(b) Nuclear power and reactors

(i) Computer applications for nuclear energy programmes (para. 417);

(ii) Information on nuclear facilities (para. 370);

(iii) Technical progress and economic aspects of desalting and energy centres (para. 396);

(iv) Reprocessing of highly irradiated fuels (para. 412(a));

(v) Reactivity measurements: technical review of sophisticated work (para. 419);

(vi) Behaviour of cladding materials and moderators under irradiation (para. 412(b)); and

(vii) Utilization of reactor centres in training staff for nuclear power systems (para. 430);

(c) Health, safety and waste management

(i) Nuclear accident dosimetry systems (para. 445(c));

(ii) Guidelines for the preparation of safety evaluation reports for reactors (para. 497(a));

(iii) The safe use of nuclear explosions for peaceful purposes (para. 497(b));

(iv) Use of local minerals in treatment of radioactive wastes (para. 474(b));

(v) Safe handling of plutonium (para. 445(d));

(vi) Somatic and genetic effects on marine biota caused by the radioactivity in the sea (para. 493); and

(vii) Review of packaging designs submitted by Member States (para. 441(b));

(d) Scientific and technical information

(i) One or more technical aspects of INIS (para. 528);

(e) Research and services in physical sciences

(i) Statistics of resonance parameters or
Radioactive capture of fast neutrons (para. 197);

(ii) Utilization of neutron generators in physics and chemistry (para. 189(c)); and

(iii) Radiation chemistry (para. 200(a)) or
Neutron activation analysis (para. 200(b)) or
Analytical chemistry of nuclear materials (para. 200(c));

(f) Isotopes and radiation sources

(i) Industrial applications of radioisotopes in developing countries (para. 227);

(ii) Examination of completed hydrology projects (para. 216);

(iii) Quantitation of radioactivity uptake measurements in body organs (para. 130(e));

(iv) Dosimetry of internally-administered radioisotopes (para. 130(f));

(v) Absolute dose determination (para. 175(a));

(vi) Radiosterilization of biological tissues for grafting purposes (para. 147);

(vii) Radiation sensitivity of toxins and animal poisons (para. 148);

(viii) Application of isotopes to studies of hypo-protein-semic diseases (para. 96(b));

(ix) Radiation disinfestation of stored food (para. 107(a)); and

(x) Wholesomeness aspects of food irradiation (para. 107(b));

(g) Safeguards

(i) Safeguards practices for fuel fabrication plants (para. 585);

(ii) System studies for nuclear power complexes (para. 585); and

(iii) Safeguards methods and techniques (para. 585).

Research co-ordination meetings

(a) Regional meeting on waste management research and development (Latin America)(para. 482);

(b) Use of electrodialysis for treatment of radioactive wastes (para. 483);

(c) The application of the sterile-male technique for control of insects (para. 74(a));

(d) Activation analysis in studies of mineral metabolism in man (para. 130(h));

(e) Induced mutations in wheat and barley breeding (Near East)(para. 89(a)(ii));

(f) Use of isotopes and radiation in studies of etiology effects and control of parasitic diseases (para. 96(a)); and

(g) Isotope and radiation study of physical and chemical relationship in soils and plants (para. 67(a)(iii)).

Working groups

(a) The use of nuclear techniques (IHD)(para. 212);

(b) Fast reactors (para. 337);

(c) Pressure vessels (para. 364);

(d) Reactor radiation measurements (para. 422);

(e) Uranium and thorium resources (with ENEA)(para. 407(c)(iii)); and

(f) Magnetohydrodynamics (liaison meeting, jointly with ENEA)(para. 371).

Section 3. Seminars, symposia and conferences

Table 43

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Seminars, symposia and conferences	122 269	155 000	(10 000) (6.5%)	145 000

648. Following consultations with SAC it is proposed to convene a total of 13 symposia or seminars during 1969. In order to be able to plan such meetings early in the next year, the Board is listing 16 meetings to be held between 1 January 1969 and 31 March 1970. Of these, 12 or 13 are expected to be convened in 1969. As a result of guidance given by SAC in January 1968 the meetings planned will deal with the following subjects:

(a) Symposium on performance of nuclear power reactor components (para. 363);

(b) Symposium on nuclear energy costs and economic development (para. 378);

(c) Symposium on fast breeder reactors (para. 340)
(If further investigation should show that it is difficult to avoid overlapping with other international meetings on this subject, it will be replaced by a symposium on reactor noise analysis);

(d) Symposium on handling of radiation accidents involving exposure of persons (including some decontamination problems)(para. 445(e));

(e) Symposium on safety aspects of hot laboratory equipment and remote-control systems (para. 445(b));

(f) Regional seminar on preparation of input for INIS (para. 528);

(g) Symposium on nuclear information handling (para. 528);

(h) Symposium on radiation-induced cancer and mutation (para. 144);

(i) Symposium on nuclear data for reactors (1970)(para. 197);

(j) Symposium on use of isotopes in hydrology (1970)(para. 215);

(k) Symposium on utilization of large radiation sources and accelerators in industrial processing (para. 227);

(l) Symposium on radioisotope techniques for the measurement of biologically active substance in vitro (with WHO)(para. 130(g));

(m) Symposium on induced mutations in plant breeding and genetics (with FAO)(para. 89);

(n) Symposium on physics and chemistry of fission (para. 189(a));

(o) Symposium on radiation damage in solids and reactor materials (para. 189(b));

(p) Symposium on heavy-water production (para. 407(d)).

649. The Board proposes that the Director General be authorized to vary the programme within the framework of the above subjects and to the extent that the overall work of the Agency so requires, within the limits of the appropriation.

650. Several study groups are expected to be organized in the 15-month period from 1 January 1969 to 31 March 1970, on subjects to be selected from the following:

(a) Nuclear desalting in the Mediterranean region (para. 396);

(b) Research reactor utilization in the Far East (para. 430);

(c) Consultation between countries that will begin operating INIS on 1 January 1970 (para. 528);

(d) Utilization of low-energy accelerators (para. 190(b));

(e) Plant breeding in Latin America (para. 90(b));

(f) Application of nuclear techniques to animal physiology and nutrition (para. 99);

(g) Recruitment and training of scientific and technical personnel for medical radioisotope work (para. 131(b));

(h) Role of radiobiology in life sciences in emerging nations (para. 146);

(i) Isotope production in Latin America (para. 200(d));

(j) Radioisotopes in oil industry (para. 227); and

(k) Legislation and regulations on radiation protection (para. 441(c)).

651. As in previous years, an amount of $15 000 has been included in the estimate to cover contributions towards scientific meetings organized by non-governmental scientific bodies which deal with subjects in which the Agency has a special interest. In addition, it is expected that the Agency will in 1969 continue to co-sponsor scientific meetings held by other international organizations and invite appropriate co-sponsorship of its own meetings.

652. In the light of the actual expenditure incurred in previous years a reduction of $10 000 is proposed for 1969. The relatively low level of actual costs in 1967 was due to the fact that more than the usual number of meetings were co-sponsored by other organizations, including the sharing of costs, and several cost-free experts were furnished as discussion leaders and lecturers. It is, however, not certain that this will continue. The newly implemented policy of granting up to 50% of the cost of travel to especially deserving participants from developing countries, up to a maximum of $2000 for each meeting, will also increase costs above the 1967 actual level.

Section 4. Distribution of information

Table 44

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Publications				
Printing, block-making and art work	20 566	23 000	-	23 000
Paper	44 896	41 000	-	41 000
Supplies and materials	24 217	22 000	3 000	25 000
Authors' fees	18 277	20 000	-	20 000
Scientific editing	-	-	-	-
Salaries and wages	101 344	100 000	10 000	110 000
Common staff costs	26 104	28 000	1 000	29 000
External translation	386	1 000	-	1 000
Distribution costs	40 984	40 000	5 000	45 000
Equipment	4 303	10 000	-	10 000
Sales promotion	4 764	10 000	(4 000)	6 000
Purchase of publications for distribution	2 484	2 000	1 000	3 000
Sub-total	288 325	297 000	16 000	313 000
Less: Transfer from the Publications Revolving Fund	50 000	-	-	-
Revenues from sales and other sources	154 438	159 000	26 000	185 000
Sub-total, publications	83 887	138 000	-	128 000
Library and film services	55 852	56 500	-	56 500
Visual media	17 698	21 500	-	21 500
TOTAL	157 437	216 000	(10 000) (4.6%)	206 000

653. It is assumed that the revenues from sales and other sources will increase in 1969 by $26 000. This increase will not only offset increased expenditures of $16 000 for the publications programme, but will in addition allow a reduction of $10 000 in this Appropriation Section. If the expected increase of $26 000 in revenues does not materialize, the expenditure will be kept to the level of the appropriation. On the other hand, if revenues are higher than estimated, the staff and expenditure may be increased to the extent required by the work-load, in accordance with the practice approved in the past.

654. The relatively low level of actual net costs for publications in 1967 was due to the abolition of the Publications Revolving Fund as from 1 January 1967 and the transfer of the $50 000 balance in this Fund to reduce net costs under this Appropriation Section [28]. If this non-recurring revenue had not become available in 1967, the net cost for publications would have amounted to $133 887, or almost the approved level for 1968 and the level proposed for 1969.

655. No increase is proposed in the appropriation for library acquisitions, including films, although the price of books, scientific magazines and technical journals is expected to continue to rise gradually above the level experienced in the past.

[28] GC(X)/RES/213.

656. It is also proposed to maintain the appropriation for visual media at the level approved for 1968. Several of the Agency's activities have gained good publicity from film footage prepared for TV release throughout the world. With the sum proposed the work could continue to be carried out effectively, but it would have to be confined to activities which have the highest publicity value and maximum public appeal.

Section 5. Scientific and technical services

Table 45

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Research contracts	742 997	803 000	-	803 000
Safeguards development	107 884	95 000	55 000	150 000
Technical contracts	42 760	44 000	33 000	77 000
Health and safety services	4 071	5 000	-	5 000
TOTAL	897 712	947 000	88 000 9.3%	1 035 000

657. Research contracts. Although the gradual increase in salaries and wages and cost of materials and supplies should be reflected in an increase in the estimate for research contracts in 1969, a proposal for an increase has been deferred in the interests of economy. The result is that the research contract programme for 1969 will enable slightly less work to be carried out than was possible in the past two years with approximately the same level of appropriation. The following table shows the breakdown of the total budget estimate for research contracts by major subjects. The change in distribution in 1969 is in accordance with the percentage distribution recommended by SAC.

Table 46

Subject of research	1967 actual $	1968 budget $	1969 estimate $
Radioactive waste management and environmental research	96 770	90 000	88 000
Health physics and radiation protection	32 550	95 000	90 000
Radiation biology	79 204	70 000	68 000
Studies involving reactors	101 340	110 000	124 000
Nuclear physics and radiation chemistry	-	15 000	15 000
Radioisotope applications in:			
Agriculture	180 870	155 000	155 000
Food	41 950	37 000	37 000
Industry	22 700	21 000	21 000
Medicine	136 338	155 000	153 000
Water resources development	51 275	55 000	52 000
TOTAL	742 997	803 000	803 000

658. Safeguards development. Because of the increasing need for safeguards development to cope with the considerable expansion expected in the Agency's safeguards programme, it is proposed that the appropriation for safeguards development be increased by $55 000

in 1969. This proposal is based on the experience during 1967 when almost $108 000 was utilized, which would indicate that the 1968 appropriation of only $95 000 is apt to be inadequate.

659. Technical contracts. In order to pursue further the development of INIS it is proposed to increase the provision for technical contracts by $32 000 in 1969. In addition, the contract covering measurement of oxygen and deuterium in precipitation is increased by $1000 owing to higher price levels. The estimated distribution of costs for technical contracts for the three years is summarized below.

Table 47

Item	1967 actual $	1968 budget $	1969 estimate $
Hydrological contracts	18 500	14 000	15 000
ICRU-ICRP contracts	18 000	18 000	18 000
Nuclear literature contracts (including INIS)	6 260	12 000	44 000
TOTAL	42 760	44 000	77 000

Section 6. Salaries and Wages

Table 48

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Established posts	3 990 533	4 358 500	533 500	4 892 000
Overtime and night differential	8 887	10 000	-	10 000
Temporary assistance	59 660	20 000	-	20 000
Consultants	67 676	100 000	(15 000)	85 000
TOTAL	4 126 756	4 488 500	518 500 11.6%	5 007 000

660. The above table excludes salaries and wages chargeable to the policy-making organs, the Agency's Laboratory, the Monaco Laboratory, the Trieste Centre and those incurred in connection with typesetting and printing of Agency publications.

661. Salaries and wages for 1969 have been calculated on the basis of salary scales effective since 1 January 1966 for Professional staff members. In respect of GS and M&O salaries, however, an adjustment has been made to reflect the new level of salaries approved for use in 1968 by the Board of Governors, that is, to include an interim adjustment for salary increases which took place during 1967 for similar local employment in Vienna. An allowance has also been made in the 1969 estimate for a post adjustment for the full year because it became effective on 1 January 1968.

662. The lapse and lag factor reflects savings resulting from delays in replacement of staff and recruitment of new staff, for which an average delay of approximately two months has been assumed.

663. The total manning table for the entire Agency is shown in Annex II, but may be summarized for 1968 and 1969 as follows:

Table 49

Organization	1968				1969			
	P	GS	M&O	Total	P	GS	M&O	Total
Headquarters establishment	301	368	115	784	322	380	115	817
Operational facilities:								
Seibersdorf Laboratory	29	51	17	97	29	53	19	101
Monaco Laboratory	4	11	-	15	5	12	-	17
Trieste Centre	4	12	5	21	4	12	5	21
Sub-total	37	74	22	133	38	77	24	139
TOTAL	338	442	137	917	360	457	139	956

664. Table 50 below shows estimates for the total Headquarters establishment of posts proposed for 1969 exclusive of those assigned to the operational facilities - the Laboratory, e Monaco Laboratory and the Trieste Centre - for which separate detailed tables have been included in the explanation in the programme.

Table 50

1967	1968	1969	Position	1967 $	1968 $	1969 $
1	1	1	Director General	20 000	20 000	20 000
5	5	5	Deputy Directors General/ Inspector General	105 000	105 000	105 000
17	18	18	Director (D-1/2)	273 955	290 070	290 070
58	63	69	Senior officer (P-5)	760 380	825 930	904 590
82	93	96	First officer (P-4)	879 860	997 890	1 030 080
73	70	75	Second officer (P-3)	648 897	622 230	666 675
19	24	29	Associate officer (P-2)	138 453	174 888	211 323
25	27	29	Assistant officer (P-1)	142 250	153 630	165 010
280	301	322	Sub-total	2 968 795	3 189 638	3 392 748
341	368	380	General Service staff	989 923	1 104 000	1 263 500
108	115	115	Maintenance and Operatives Service staff	184 553	196 650	224 250
729	784	817	TOTAL	4 143 271	4 490 288	4 880 488
			Post adjustment	6 868	6 800	136 800
			Special post and other allowances	15 882	15 950	18 450
			Salary increments	324 979	331 575	362 000
			Sub-total	4 491 000	4 844 613	5 397 748
			Less: Recruitment lapse and lag factor	75 812	61 113	70 748
			Sub-total	4 415 188	4 783 500	5 327 000
51	50	49	Less: Policy-making organs	323 369	325 000	325 000
40	40	40	Publications programme	101 286	100 000	110 000
638	694	728	NET TOTAL	3 990 533	4 358 500	4 892 000

665. The increase of $543 500 (before deduction of costs chargeable to other Appropriation Sections) can be broken down as follows:

Professional post adjustments	$130 000
Special post and other allowances	2 500
Increase in annual salary increments	30 425
GS and M&O salary increases	147 200
New posts and reclassifications	243 010
	553 135
Less: Increase in lapse and lag factor	9 635
NET TOTAL	543 500

666. Table 51 below shows the proposed changes in the manning table for established posts in 1969; staffing of Divisions and Offices not shown in the table remains at the 1968 level [29].

Table 51

Division or Office	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Administration									
Budget and Finance	-	-	-	-	-	-	1	-	1
Conference and General Services	-	-	-	-	-	-	1	-	1
Personnel	1	(1)	-	-	-	-	-	-	-
Sub-total	1	(1)	-	-	-	-	2	-	2
Department of Research and Isotopes									
Life Sciences	-	-	-	-	2	2	-	-	2
Research and Laboratories	1	-	2	-	-	3	1	-	4
Sub-total	1	-	2	-	2	5	1	-	6
Department of Safeguards and Inspection	4	4	1	1	-	10	5	-	15
Department of Technical Operations									
Health, Safety and Waste Disposal	-	-	-	-	1	1	1	-	2
Nuclear Power and Reactors	-	-	-	1	-	1	1	-	2
Scientific and Technical Information	-	-	2	3	(1)	4	2	-	6
Sub-total	-	-	2	4	-	6	4	-	10
TOTAL Headquarters increases	6	3	5	5	2	21	12	-	33

[29] For the complete manning table, see Annex II.

667. The following explanations are provided for the proposed staffing changes listed above:

(a) Division of Budget and Finance. One GS post is required for a finance clerk, mainly because the number of payment vouchers has almost doubled in the past few years, particularly in respect of travel on recruitment, home leave, termination, safeguards inspections and the Trieste Centre;

(b) Division of Conference and General Services. One GS post is required because of the increased work-load, particularly in registry and mail-handling services;

(c) Division of Personnel. It is proposed to regrade the existing P-4 post for the Agency's Medical Officer to P-5 because of his seniority and the increased responsibility involved in providing services for the increased number of staff members of both the Agency and UNIDO;

(d) Division of Life Sciences. Two P-1 posts are required to support senior staff. The incumbents of those two posts would, in the course of their assignments to the Agency, gain experience which would prove useful on return to their home countries;

(e) Division of Research and Laboratories. Reclassification of an existing P-4 post to the P-5 level for a groundwater hydrologist is proposed, and one P-4 post and two P-3 nuclear data processing posts are required because of the increasing work-load in the exchange of nuclear data between world centres. One additional GS post is also required for nuclear data work;

(f) Department of Safeguards and Inspection. It is proposed to employ a further ten Professional and five GS staff members because of the Division's increased responsibilities relating to development and to inspections under existing and future Safeguards Transfer Agreements. It is proposed to increase the Professional staff by four P-5's, four P-4's, one P-3 and one P-2;

(g) Division of Health, Safety and Waste Disposal. One P-1 post and one GS supporting post are required because of the increased work-load in this Division;

(h) Division of Nuclear Power and Rectors. One existing P-1 staff member should be regraded to the P-2 level and the vacant P-1 post filled by a junior officer. In addition one GS post is required because of the increased work-load;

(i) Division of Scientific and Technical Information. Two new P-3 posts and one upgrading from P-1 to P-2 in support of INIS and two P-2 and two GS posts in support of computer services are proposed.

Section 7. Common staff costs

Table 52

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Pension fund contributions	536 449	602 000	122 000	724 000
Medical benefits and social security contributions	101 415	92 000	19 000	111 000
Dependency allowances	250 009	275 000	(5 000)	270 000
Education grants	123 427	130 000	5 000	135 000
Non-residents' allowances	70 479	85 000	(10 000)	75 000
Travel on recruitment and termination	68 696	103 000	(14 000)	89 000
Assignment allowances	176 521	183 000	9 000	192 000
Installation expenses	63 519	75 000	9 000	84 000
Removal of household effects and excess baggage	57 525	53 000	7 000	60 000
Travel on home leave	85 071	117 000	(9 000)	108 000
Repatriation grants	100 305	90 000	26 000	116 000
Other costs	47 309	40 000	20 000	60 000
Sub-total	1 680 725	1 845 000	179 000	2 024 000
Less: Policy-making organs	111 492	118 000	-	118 000
Publications programme	26 104	28 000	1 000	29 000
TOTAL	1 543 129	1 699 000	178 000 10.5%	1 877 000

668. The major increase in this Section is for contributions in respect of staff members to the United Nations Joint Staff Pension Fund. Part of this increase is offset by an estimated increase in miscellaneous income from the refund of contributions when staff members leave the Agency after less than five years of service and half of the Agency's contribution is refunded. This offsetting amount is expected to reach a total of $35 000 in 1969. The proposals for the other increases and decreases under common staff costs are based largely on recent experience of the actual costs in 1967, as shown in the table.

669. Most of the items of expenditure in this Section are directly related to the make-up of the Agency's staff, including family size, number of children at school, country of origin, etc., which are very difficult to estimate in advance, particularly when a substantial number of the staff hold fixed-term contracts and turnover is relatively high. For that reason, the total of the appropriation is normally converted to a percentage of total salaries and wages for established posts and the distribution between items is made on the basis of recent experience. The estimate for 1969 is based on an expected ratio of 38.3% of common staff costs to salary and wage costs for established posts. Of the proposed increase of $178 000 in 1969, $78 000 is due to price rises and salary increases for the present staff, $90 000 is related to proposed increases in staff, and the balance of $10 000 under the item "Other costs" in 1969 reflects the probable share

of the Agency in the cost of the Joint Inspection Unit established as a result of the recommendation by the General Assembly's Ad Hoc Committee [30].

Section 8. Duty travel and missions

Table 53

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Duty travel of staff	123 830	131 000	(7 000)	124 000
Advisory services to Member States	6 351	23 000	(8 000)	15 000
Special missions	32 059	50 000	(5 000)	45 000
Inspection travel	52 632	92 000	-	92 000
TOTAL	214 872	296 000	(20 000) (6.8%)	276 000

670. Two Appropriation Sections of the Regular Budgets for earlier years, "Special missions" and "Duty travel of staff", [31] have been consolidated in this Section.

671. It was often possible in 1967 to arrange for more than one purpose to be served by one journey, and journeys were carefully co-ordinated so as to avoid duplication of travel within a relatively short time in the same area by different staff members. The The continuation of this practice in future would allow a reduction of $20 000 in this Section.

Section 9. Representation and hospitality

Table 54

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Representation and hospitality	34 576	35 000	2 000 5.7%	37 000

672. This appropriation provides $25 000 to cover representation allowances of the Director General and the five Heads of Departments; the balance is for general hospitality offered by senior staff in connection with their duties, including hospitality offered at Agency meetings.

673. The level of this appropriation, insofar as it relates to hospitality, has remained unchanged since 1958 and it is now proposed to increase the allowance for general hospitality from $10 000 to $12 000 in 1969. This increase is required to cover the gradual increase in the cost of such hospitality and also to provide sufficient funds to allow the cost of hospitality offered at Agency meetings to be charged to this Section.

[30] United Nations document A/6343, para. 67.B.

[31] See, for example, document GC(XI)/360, paras 30-31 and 69-71.

During 1967, because of a shortage of funds for this purpose, it was necessary to charge approximately $1500 to contributions from host Governments for Agency meetings held away from Headquarters. The proposed $2000 increase in the appropriation for 1969 and a similar increase in 1970 will offset cost increases since 1958 and also allow an accurate comparison of costs between years to be made. The increasing need for hospitality expenditure at the New York Office in order to represent properly the Agency's interests and the rising cost of such hospitality are other factors in support of this proposal.

Section 10. Common services, equipment and supplies

Table 55

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Communications and transport	102 930	100 500	9 500	110 000
Utilities	94 182	97 000	-	97 000
Rental, alteration and maintenance of premises and equipment	56 239	75 000	(16 000)	59 00
Rental and related costs for additional office space	-	34 000	-	34 000
Computer services and related costs	151 965	246 000	22 000	268 000
Contractual and other administrative services	28 421	30 000	-	30 000
Insurance and bank charges	25 115	30 000	(3 000)	27 000
Stationery and office supplies	36 782	25 500	8 500	34 000
Reproduction supplies and paper	23 609	22 000	2 000	24 000
Miscellaneous services and supplies	43 366	38 500	5 500	44 000
Furniture and fixtures	20 938	20 000	-	20 000
Office machines and other equipment	94 896	60 500	(12 000)	48 500
TOTAL	678 443	779 000	16 500 2.1%	795 500

674. The proposed 2.1% increase, amounting to $16 500, in this Appropriation Section reflects increases of $47 500 for several items of expenditure, partially offset by proposed reductions of $31 000 for certain other items.

675. The proposed increase of $9500 for "Communications and transport" is necessary because of the constantly increasing costs of postage, telephone and cable services and the increased requirements for such services. The annual increase in such costs during the past two years has amounted to 15%. The proposed appropriation for 1969 will allow for an increase of only about 4% per year in 1968 and 1969 over the actual costs in 1967.

676. The proposed increase of $22 000 for "Computer services and related costs" is required to cover adequately the period of changeover from the IBM-1401 computer now in use to the IBM-360/30 model, which is scheduled for delivery in December 1968. After this changeover is completed, some decrease under this item may be possible in 1970. Part of the extra costs in 1969 are for rental of special equipment which will temporarily permit the running of programmes on the new model. When the rewriting of programmes is completed in 1969 and all programmes have been adapted to the IBM-360/30 model, this special equipment will no longer be required. Since it will not be possible to transfer all the work now done at the Technische Hochschule to the Agency's new computer in the early part of 1969, the appropriation includes $15 500 for continued work on nuclear data processing at the Technische Hochschule, which may not be necessary after 1969.

Section 11. Operational facilities

Table 56

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
1. The Seibersdorf Laboratory (including Headquarters):				
Laboratory charges	627 645	690 000	38 000	728 000
FAO/IAEA fly-rearing facility	-	50 000	(50 000)	-
Sub-total	627 645	740 000	(12 000)	728 000
2. The Monaco Laboratry	101 869	108 000	23 000	131 000
3. The Trieste Centre	85 000	115 000	-	115 000
TOTAL	814 514	963 000	11 000 1.1%	974 000

677. This new Section is included as a result of the revision in the presentation of the Regular Budget Appropriation Sections referred to in paragraph 630(c) above. As shown in Table 56, the proposed net increase of $11 000 is made up of $23 000 for the Monaco Laboratory and $38 000 for the Seibersdorf Laboratory charges, largely offset by the $50 000 reduction in the non-recurring item for construction of the FAO/IAEA fly-rearing facility at the Seibersdorf Laboratory. In accordance with a decision taken by the Board in June 1967 no change is proposed in the Regular Budget appropriation for the Trieste Centre. As a result, the net increase amounts to only 1.1%, which is less than the total increases in salary and other cost levels at the facilities involved. An explanation of the changes for each of these facilities, together with a breakdown of the total budget for each facility, whether financed from the Regular Budget or from other sources, is given in the programme. [32]

Section 12. Contingent extraordinary expenditures

Table 57

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Contingencies	-	130 000	-	130 000

678. No increase in this appropriation is proposed for 1969. In accordance with the recommendations of the General Assembly's Ad Hoc Committee [33] this Section was included in the Agency's budget for the first time in 1968. The funds provided are primarily intended to enable the Board to approve extraordinary increases in expenditures such as may result from a post adjustment to the salaries of Professional staff, from salary or wage increases not included in the relevant Appropriation Sections or from other unforeseen causes.

[32] Sections 5, 6 and 9 of the programme.

[33] United Nations document A/6343, para. 41.

679. Having regard to the present rate of increase in the cost of living in Vienna and in the level of salaries for comparable local staff, it is estimated that it may be necessary to finance from this Section an additional post adjustment during the last four to five months of 1969 and additional salary increases for GS and M&O staff.

680. The funds appropriated for this Section may only be used with the specific prior approval of the Board, and a clause to ensure this has been included in the appropriation resolution.

III. OPERATIONAL BUDGET ESTIMATES

A. The General Fund

Summary of receipts and allocations

Table 58

Item	1967 actual $	1968 budget $	1969 estimate $
RECEIPTS			
Voluntary contributions	1 441 782	2 000 000	2 000 000
Special contributions	322 898	322 500	350 000
Miscellaneous income	44 046	50 000	50 000
TOTAL	1 808 726	2 372 500	2 400 000
ALLOCATIONS			
Transfers to Operating Fund I	531 898	529 500	561 000
Transfers to Operating Fund II	1 276 828	1 843 000	1 839 000
TOTAL	1 808 726	2 372 500	2 400 000

681. In accordance with Article XIV. F of the Statute, the General Fund is the depository of voluntary contributions from Member States or from other authorized sources. It provides, by transfers to Operating Funds I and II, as appropriate and as approved by the Board, monies for the Agency's operational activities.

682. On the basis of estimated receipts totalling $2 400 000, allocations of $561 000 and $1 839 000 to Operating Funds I and II respectively are foreseen. If, and to the extent that, voluntary contributions should fall short of the target, the Director General will, in consultation with the Board, apportion the available monies between the Operating Funds in the light of their requirements at the time, up to but not exceeding the amounts allocated by the General Conference.

B. Operating Fund I

(a) Summary of receipts and expenditures

Table 59

Item	1967 actual $	1968 budget $	1969 estimate $
RECEIPTS:			
Unallocated balances brought forward	123 339	-	-
Savings on prior years' operations	4 826	-	-
Transfer from the General Fund	531 898	529 500	561 000
Income from reimbursable services	48 784	57 500	67 000
Reimbursable research work	5 410	pro memoria	pro memoria
Miscellaneous income	60 213	105 000	45 000
TOTAL	774 470	692 000	673 000
EXPENDITURES:			
Laboratory	244 718	229 500	243 000
The Monaco Laboratory	45 092	45 000	45 000
The Trieste Centre	421 320	417 500	385 000
Unobligated earmarkings	63 340	-	-
TOTAL	774 470	692 000	673 000

(b) Allocations

1. The Laboratory

Table 60

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Laboratory charges, Operating Fund I[a/]	244 718	229 500	13 500	243 000

a/ For total Laboratory operating costs and charges to the Regular Budget see Table 13 in the programme and Table 56 above.

683. Based on cost accounting procedures approved by the Board, the operating costs of the Laboratory are borne in a ratio of roughly 75:25 by the Regular and the Operational Budget respectively. That part which is borne by Operating Fund I is derived from the sources shown in the table below.

Table 61

Item	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Unobligated balance brought forward	76 626	-	-	-
Savings on prior years' obligations	1 900	-	-	-
Transfer from the General Fund	174 000	172 000	4 000	176 000
Reimbursable laboratory services	48 784	57 500	9 500	67 000
USAEC research contracts	5 410	-	-	-
Miscellaneous revenues	6 080	-	-	-
Total revenues	312 800	229 500	13 500	243 000
Unobligated balance carried forward	68 082	-	-	-
NET TOTAL	244 718	229 500	13 500	243 000

2. International Laboratory of Marine Radioactivity

Table 62

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Charges to Operating Fund I[a/]	45 092	45 000	-	45 000

a/ For total operating costs of the laboratory at Monaco and charges to the Regular Budget see Table 22 in the programme and Table 56 above.

684. The Monaco Laboratory is financed partly from the Regular Budget and partly from a special contribution by the Government of Monaco. The part which is financed from the latter, through Operating Fund I, is derived from the sources shown in the table below.

Table 63

Item	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Savings on prior years' operations	194	-	-	-
Transfer from the General Fund	44 898	45 000	-	45 000
TOTAL	45 092	45 000	-	45 000

3. International Centre for Theoretical Physics

Table 64

Item	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Charges to Operating Fund I[a/]	421 320	417 500	(32 500)	385 000

a/ For total operating costs of the Trieste Centre and charges to the Regular Budget see Table 17 in the programme and Table 56 above.

685. The operations of the Trieste Centre are financed in part from the Agency's Regular Budget and in part - through Operating Fund I - from voluntary contributions by the Italian Government and by other contributions from various other sources. That part which is financed through the Operational Budget is derived from the revenues shown in the table below.

Table 65

Item	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Unobligated balance brought forward	46 713	-	-	-
Savings on prior years' obligations	2 732	-	-	-
Operating Fund I:				
Fellowships (from Operating Fund II)	35 000	35 000	-	35 000
Government of Italy	278 000	250 000	-	250 000
Ford Foundation	40 000	105 000	(60 000)	45 000
Other contributions	10 000	27 500	27 500	55 000
Miscellaneous income	3 433	-	-	-
Sub-total	416 578	417 500	(32 500)	385 000
Over obligation carried forward	4 742[a/]	-	-	-
TOTAL	421 320	417 500	(32 500)	385 000

a/ GC(XII)/384, Part III, para. 32.

C. Operating Fund II

(a) Summary of receipts and expenditures

Table 66

Item	1967 actual $	1968 budget $	1969 estimate $
RECEIPTS			
Savings from prior years' operations	274 524	-	-
Transfers from the General Fund	1 276 828	1 843 000	1 839 000
Income from reimbursable services	66 568	pro memoria	-
Miscellaneous income	1 206	-	-
TOTAL	1 619 126	1 843 000	1 839 000
EXPENDITURES			
Technical assistance, training and research contracts	1 035 732	1 843 000	1 839 000
Unobligated earmarkings	308 870	-	-
Savings	274 524	-	-
TOTAL	1 619 126	1 843 000	1 839 000

(b) Allocations

Technical assistance and training

Table 67

Item of expenditure	1967 actual $	1968 budget $	Increase or (decrease) 1968/1969 $	1969 estimate $
Experts and equipment	545 155	977 000	-	977 000
Fellowships and training	490 716	866 000	(4 000)	862 000
Research contracts	(139)	-	-	-
TOTAL	1 035 732	1 843 000	(4 000)	1 839 000

A N N E X E S

ESTIMATED USE C

A. By programm

Programmes	TOTAL	Policy-making organs	Panels and committees	Seminars, Symposia and Conferences	Distribution of information	Scientific and technical services	Salarie and wag
1968							
A. Policy-making organs	568 500	568 500	-	-	-	-	-
B. Executive management and technical programme planning	280 000	-	12 000	-	-	-	173 0
C. Programmes of activity							
1. Technical assistance and training	2 452 700	-	6 000	-	-	-	424 0
2. Food and agriculture	487 000	-	29 500	18 000	-	192 000	165 8
3. Life sciences	597 500	-	31 500	14 000	-	234 000	219 0
4. Physical sciences	616 000	-	31 000	50 000	-	105 000	290 5
5. The Laboratory	969 500	-	-	-	-	-	-
6. The International Centre for Theoretical Physics	532 500	-	-	-	-	-	-
7. Nuclear power and reactors	657 000	-	24 000	39 000	-	110 000	329 0
8. Health, safety and waste management	616 000	-	39 000	18 000	-	199 000	244 3
9. Monaco Laboratory	153 000	-	-	-	-	-	-
10. Information and technical services	1 308 900	-	13 000	-	216 000	12 000	575 7
11. Safeguards	634 300	-	6 000	-	-	95 000	310 9
Sub-total	9 024 400	-	180 000	139 000	216 000	947 000	2 559 2
D. Service and support activities common to a number of programmes	720 800	-	-	15 000	-	-	506 1
E. Administrative services							
1. Administration	1 061 800	-	8 000	1 000	-	-	718 8
2. Common services	1 226 500	-	-	-	-	-	531 4
Sub-total	2 288 300	-	8 000	1 000	-	-	1 250 2
F. Other	130 000	-	-	-	-	-	-
TOTAL	13 012 000	568 500	200 000	155 000	216 000	947 000	4 488 5
1969							
A. Policy-making organs	568 500	568 500	-	-	-	-	-
B. Executive management and technical programme planning	290 500	-	12 000	-	-	-	181 0
C. Programmes of activity							
1. Technical assistance and training	2 466 700	-	6 500	-	-	-	437 4
2. Food and agriculture	494 500	-	26 000	16 500	-	192 000	175 0
3. Life sciences	613 700	-	26 000	16 500	-	230 000	237 8
4. Physical sciences	668 200	-	38 500	38 500	-	103 000	339 3
5. The Laboratory	971 000	-	-	-	-	-	-
6. The International Centre for Theoretical Physics	500 000	-	-	-	-	-	-
7. Nuclear power and reactors	688 500	-	32 500	27 500	-	124 000	347 2
8. Health, safety and waste management	623 700	-	39 000	11 000	-	192 000	263 9
9. Monaco Laboratory	176 000	-	-	-	-	-	-
10. Information and technical services	1 501 200	-	6 500	16 800	206 000	44 000	670 0
11. Safeguards	921 900	-	13 000	-	-	150 000	475 7
Sub-total	9 625 400	-	188 000	126 800	206 000	1 035 000	2 947 0
D. Service and support activities common to a number of programmes	757 500	-	-	18 200	-	-	535 2
E. Administrative services							
1. Administration	1 093 000	-	-	-	-	-	756 0
2. Common services	1 298 100	-	-	-	-	-	587 8
Sub-total	2 391 100	-	-	-	-	-	1 343 8
F. Other	130 000	-	-	-	-	-	-
TOTAL	13 763 000	568 500	200 000	145 000	206 000	1 035 000	5 007 0

UNDS IN 1968 AND 1969

id appropriations

Appropriation Sections								
ommon iff costs	Duty travel and missions	Representation and hospitality	Common services, equipment and supplies	Operational facilities			Operating Fund II	Contingency
				Seibersdorf Laboratory	Monaco Laboratory	Trieste Centre		
-	-	-	-	-	-	-	-	-
65 000	15 000	15 000	-	-	-	-	-	-
62 300	14 700	2 700	-	-	-	-	1 843 000	-
60 900	19 800	1 000	-	-	-	-	-	-
78 000	20 000	1 000	-	-	-	-	-	-
03 000	35 000	1 500	-	-	-	-	-	-
-	-	-	-	969 500	-	-	-	-
-	-	-	-	-	-	532 500	-	-
22 500	31 000	1 500	-	-	-	-	-	-
90 700	23 700	1 300	-	-	-	-	-	-
-	-	-	-	-	153 000	-	-	-
17 100	17 300	800	257 000	-	-	-	-	-
23 30	96 400	2 700	-	-	-	-	-	-
57 800	257 900	12 500	257 000	969 500	153 000	532 500	1 843 000	-
99 600	-	100	-	-	-	-	-	-
74 100	22 600	7 300	30 000	-	-	-	-	-
02 500	500	100	492 000	-	-	-	-	-
76 600	23 100	7 400	522 000	-	-	-	-	-
-	-	-	-	-	-	-	-	130 000
99 000	296 000	35 000	779 000	969 500	153 000	532 500	1 843 000	130 000
-	-	-	-	-	-	-	-	-
67 500	15 000	15 000	-	-	-	-	-	-
66 000	14 700	3 100	-	-	-	-	1 839 000	-
64 000	20 000	1 000	-	-	-	-	-	-
84 40	18 000	1 000	-	-	-	-	-	-
20 400	27 000	1 500	-	-	-	-	-	-
-	-	-	-	971 000	-	-	-	-
-	-	-	-	-	-	500 000	-	-
29 800	26 000	1 500	-	-	-	-	-	-
95 600	20 700	1 500	-	-	-	-	-	-
-	-	-	-	-	176 000	-	-	-
54 500	17 300	1 400	284 000	-	-	-	-	-
83 800	96 400	3 000	-	-	-	-	-	-
98 500	240 100	14 000	284 000	971 000	176 000	500 000	1 839 000	-
03 900	-	200	-	-	-	-	-	-
81 900	20 400	7 700	27 000	-	-	-	-	-
25 200	500	100	484 500	-	-	-	-	-
07 100	20 900	7 800	511 500	-	-	-	-	-
-	-	-	-	-	-	-	-	130 000
377 000	276 000	37 000	795 500	971 000	176 000	500 000	1 839 000	130 000

B. By activities

(Presented in the form used at present by ACC in its reports to ECOSOC)[a/]
(in thousands of US dollars)

	1968 Budget			1969 Estimate		
	Regular Budget funds	Extra-budgetary funds	Total	Regular Budget funds	Extra-budgetary funds	Total
I. Policy-making organs	569		569	569		569
II. Executive management and technical programme planning	280		280	290		290
III. Programmes of activity						
(a) General development planning and policy						
(b) Strengthening of institutions and of governmental services						
(c) Development of human resources (including education and training)		1 059	1 059		862	862
(d) Social development, welfare and living conditions						
(e) Human rights						
(f) Health protection and promotion	724	45	769	754	45	799
(g) Control and eradication of communicable diseases	290		290	288		288
(h) Development of natural resources	170		170	179		179
(i) Scientific research and the application of science to development	2 095	853	2 948	2 153	692	2 845
(j) Culture						
(k) Transport, communications and related services						
(l) Industrialization	657		657	688		688
(m) Expansion and development of trade						
(n) Collection, dissemination and improvement of basic reference material (including statistics)	185		185	178		178
(o) Material assistance to and protection of refugees						
(p) Other programmes of activity	1 733	1 802	3 535	1 951	977	2 928
(q) Activities and services common to a number of programmes	721		721	758		758
IV. Service and support activities						
(a) Administration	1 062		1 062	1 093		1 093
(b) Common services	1 227		1 227	1 298		1 298
V. Other budgetary provisions	130		130	130		130
Total	9 843[c/]	3 759	13 602	10 329[c/]	2 576[b/]	12 905

a/ See, for example, United Nations document E/4209, Table III (K).

b/ The amounts shown for 1969 do not include any UNDP/TA funds since they are not yet known.

c/ Excluding Safeguards.

Explanatory notes

In accordance with the recommendations of the General Assembly's Ad Hoc Committee of Experts to Examine the Finances of the United Nations and the Specialized Agencies, the estimated costs of activities of the Agency have been broken down by individual programmes. In cases where the programme titles used by the Agency coincide with the headings used by ACC in its report to ECOSOC, the costs of such programmes have been shown unchanged under the respective headings. This applies to Policy-making organs, Executive management and technical programme planning, Service and support activities common to a number of programmes and Administrative services (Administration and Common services). In cases where the headings used in the ACC report differ from the titles under the Agency's programme, the activities have been shown under what has been judged to be the most appropriate heading.

I. Policy-making organs

Includes all costs of annual sessions of the General Conference and all meetings of the Board of Governors and its Committees, as well as staff costs of the Secretariat of the General Conference and the Board and a part of staff costs of interpretation, language and documents services which is annually calculated on the basis of work-load and output statistics of the preceding year.

II. Executive management and technical programme planning

Includes staff costs, representation allowances and duty travel in respect of the Offices of the Director General and of two Deputy Directors General in charge, respectively, of the Departments of Research and Isotopes and Technical Operations; also the costs of meetings of the Agency's Scientific Advisory Committee.

III. Programmes of activity

(a) and (b) not applicable.

(c) Development of human resources (including education and training)

Includes that part of the Agency's Operational Budget which is described as for "Exchange and training", and the UNDP-financed fellowship programme.

(d) and (e) not applicable.

(f) Health protection and promotion

Includes the total cost of the health, safety and waste disposal programme and the costs of the Monaco project on the effects of radioactivity in the sea which is jointly financed by the Agency (from the Regular Budget) and the Government of Monaco (shown under extra-budgetary funds).

(g) Control and eradication of communicable diseases

This subject covers the application of isotopes and radiation in medicine, diagnostic and research applications; toxicity of radionuclides in man; therapeutic applications of radioisotopes and radiation. Included is the total cost of the programme of the Nuclear Medicine Section of the Division of Life Sciences.

(h) Development of natural resources

This subject covers the applications of radioisotopes in hydrology. Included is the total cost of the programme of the Hydrology Section of the Division of Research and Laboratories (Physical Sciences).

(i) Scientific research and the application of science to development

This subject covers the application of isotopes and radiation in agriculture (including soil fertility and plant nutrition, irrigation, soil moisture and structure; insect control and eradication; pesticides, weed killers and residues; plant breeding and genetics; meat and milk production; animal diseases control); and in food irradiation (including food preservation and processing and food disinfestation). It also covers research and services in physical sciences (chemistry, physics and theoretical physics) and life sciences (radiobiology and dosimetry).

Included is the total cost of the food and agriculture programme carried out by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, the cost of the Physics, Chemistry and Industrial Applications Sections and of the Office of the Director of the Division of Research and Laboratories, and the cost of the Dosimetry and Radiation Biology Sections of the Division of Life Sciences, as well as all costs of the Agency's Laboratory and of the International Centre for Theoretical Physics. Included are also Special Fund projects related to atomic energy in agriculture.

(j) and (k) not applicable.

(l) Industrialization

This subject covers nuclear power, reactors and desalting, reactor research, nuclear fuels and equipment, and the economics of nuclear power. Included are all costs of the programme carried out by the Division of Nuclear Power and Reactors.

(m) not applicable.

(n) Collection, dissemination and improvement of basic reference material (including statistics)

Included are all costs of the Agency's Library.

(o) not applicable

(p) Other programmes of activity

This subject covers technical assistance (experts and equipment only), both under the Operational Budget and UNDP. Included are the costs of the Office of the Deputy Director General in charge of technical assistance, the Programme and Implementation Divisions and the Information and technical services programme, excluding the Agency's Library.

(q) Activities and services common to a number of programmes

Includes that part of the cost of languages and interpretation services which is not chargeable to Policy-making organs or the publications programme; further, the cost of the Research Contract Administration Section in the Division of Research and Laboratories, and of the Scientific Conferences Administration Section in the Division of Scientific and Technical Information.

IV. Service and support activities

(a) Administration

Includes all costs of the Office of the Deputy Director General for Administration, the Divisions of Budget and Finance, Personnel, Internal Audit, External Liaison, and the Legal Division.

(b) Common services

Includes the cost of the Division of Conference and General Services, excluding costs chargeable to the publications programme or Policy-making organs.

V. Other budgetary provisions

Represents the amount appropriated for contingent extraordinary expenditures.

C. By major functions

(as recommended by the General Assembly's Ad Hoc Committee)

Function	1968 budget $	1969 estimates $
1. Policy-making organs	568 500	568 500
2. Administrative costs	2 568 300	2 681 600
3. Operational costs	8 112 700	8 674 900
4. General research and study costs	1 632 500	1 708 000
Sub-total	12 882 000	13 633 000
5. Contingent extraordinary expenditures[a/]	130 000	130 000
TOTAL	13 012 000	13 763 000
Sources of funds		
1. Assessments on Member States	10 163 500	10 887 500
2. Miscellaneous income	313 500	363 500
Sub-total Regular Budget	10 477 000	11 251 000
3. Voluntary contributions	2 000 000	2 000 000
4. Special contributions	322 500	350 000
5. Miscellaneous income	212 500	162 000
Sub-total Operational Budget	2 535 000	2 512 000
TOTAL	13 012 000	13 763 000

a/ Unallocated; to be used only after specific approval by the Board.

Explanatory notes

1. This Annex is included in compliance with a recommendation by the General Assembly's Ad Hoc Committee [1]. No standard definitions having yet been adopted, the allocation of costs as shown above has been made on the following basis:

(a) An item entitled "Policy-making organs" has been added in accordance with an agreement reached at a meeting of the Budget and Finance Section of CCAQ in November 1967; the costs shown here are those appearing in Appropriation Section 1 of the Regular Budget;

(b) Under "Administrative costs" are included the costs shown in the Agency's programme under "Executive management and technical programme planning" and those shown under "Administrative services";

(c) Under "General research and study costs" are included all costs appearing in Appropriation Section 5 of the Regular Budget entitled "Scientific and technical services", all costs of the International Centre for Theoretical Physics at Trieste and of the International Laboratory of Marine Radioactivity at Monaco; and

(d) Under "Operational costs" are included all remaining items.

[1] United Nations document A/6343, para. 32(c).

ANNEX II

THE MANNING TABLE

A. Summary

	DG	DDG or IG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Grand total
Office of the Director General	1		1	1			1		4	3		7
Office of Internal Audit				1		1		1	3	2		5
Department of Administration		1		1		1			3	2		5
Division of Budget and Finance			1	2	4	3	2	5	17	23		40
Division of Conference and General Services			1	2	1	2	3	2	11	92	115	218
Division of External Liaison and Protocol			2	4	1		1		8	10		18
Languages Division				1	15	24		1	41	38		79
Legal Division			1	2	2	1	1		7	5		12
Division of Personnel			1	2	2	1	1		7	16		23
Division of Public Information				1	2	1	1		5	6		11
Secretariat of the General Conference and the Board of Governors			1	1	5	6			13	5		18
Department of Research and Isotopes		1				1		1	3	2		5
Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture			1	3	7				11	7		18
Division of Life Sciences			1	5	6	1		2	15	11		26
Division of Research and Laboratories			1	6	7	7	3		24	17		41
The Agency's Laboratory				5	10	7	6	1	29	53	19	101
The Trieste Centre				1	1	1	1		4	12	5	21
The Monaco Laboratory				1	3			1	5	12		17
Department of Safeguards and Inspection		1						1	2			2
Division of Safeguards and Inspection			2	10	11	4	4	1	32	18		50
Department of Technical Assistance		1		1	1	1	1		5	6		11
Programme Division			1	3	3	1	1		9	8		17
Implementation Division			1	2	6	3			12	17		29
Department of Technical Operations		1				1		1	3	2		5
Division of Health, Safety and Waste Disposal			1	6	7	2		1	17	11		28
Division of Nuclear Power and Reactors			1	11	7	2	2	1	24	12		36
Division of Scientific and Technical Information			1	4	9	12	8	12	46	67		113
Total	1	5	18	76	110	83	36	31	360	457	139	956
Posts approved for 1968	1	5	18	70	107	77	32	28	338	442	137	917
Difference	-	-	-	6	3	6	4	3	22	15	2	39

Note: The 1969 manning table compared with the 1967 and 1968 Revised staffing levels is shown in the following organization charts, which are included on the recommendation of the General Assembly's Ad Hoc Committee.

B. By organizational units

I. Total Secretariat by Departments

SUMMARY MANNING TABLE: TOTAL SECRETARIAT

Year	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	M&O	Total
1967	1	5	17	65	94	80	28	26	316	408	129	853
1968	1	5	18	70	107	77	32	28	338	442	137	917
Change	–	–	–	6	3	6	4	3	22	15	2	39
1969	1	5	18	76	110	83	36	31	360	457	139	956

OFFICE OF THE DIRECTOR GENERAL

Grade	1967	1968	Change	1969
DG	1	1	–	1
D	1	1	–	1
P-5	–	1	–	1
P-4	1	–	–	–
P-2	1	1	–	1
Subtotal	4	4	–	4
GS	3	3	–	3
Total	7	7	–	7

OFFICE OF INTERNAL AUDIT

Grade	1967	1968	Change	1969
P-5	1	1	–	1
P-3	1	1	–	1
P-1	1	1	–	1
Subtotal	3	3	–	3
GS	2	2		2
Total	5	5		5

DEPARTMENT OF ADMINISTRATION

Grade	1967	1968	Change	1969
DDG	1	1	–	1
D	7	7	–	7
P-5	14	15	1	16
P-4	29	33	(1)	32
P-3	44	39	–	39
P-2	9	9	–	9
P-1	8	8	–	8
Subtotal	112	112	–	112
GS	189	195	2	197
M&O	108	115	–	115
Total	409	422	2	424

DEPARTMENT OF RESEARCH AND ISOTOPES

Grade	1967	1968	Change	1969
DDG	1	1	–	1
D	3	3	–	3
P-5	20	20	1	21
P-4	29	34	–	34
P-3	14	14	3	17
P-2	11	11	(1)	10
P-1	2	2	3	5
Subtotal	80	85	6	91
GS	100	110	4	114
M&O	21	22	2	24
Total	201	217	12	229

DEPARTMENT OF SAFEGUARDS AND INSPECTION

Grade	1967	1968	Change	1969
DDG	1	1	–	1
D	1	2	–	2
P-5	5	6	4	10
P-4	5	7	4	11
P-3	1	3	1	4
P-2	1	3	1	4
P-1	1	2	–	2
Subtotal	15	24	10	34
GS	9	13	5	18
Total	24	37	15	52

DEPARTMENT OF TECHNICAL ASSISTANCE

Grade	1967	1968	Change	1969
DDG	1	1	–	1
D	2	2	–	2
P-5	6	6	–	6
P-4	10	10	–	10
P-3	5	5	–	5
P-2	2	2	–	2
P-1	–	–	–	–
Subtotal	26	26	–	26
GS	31	31	–	31
Total	57	57	–	57

DEPARTMENT OF TECHNICAL OPERATIONS

Grade	1967	1968	Change	1969
DDG	1	1	–	1
D	3	3	–	3
P-5	19	21	–	21
P-4	20	23	–	23
P-3	15	15	2	17
P-2	4	6	4	10
P-1	14	15	–	15
Subtotal	76	84	6	90
GS	74	88	4	92
Total	150	172	10	182

SUMMARY MANNING TABLE: DEPARTMENT OF ADMINISTRATION

Year	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	M&O	Total
1967	1	7	14	29	44	9	8	112	189	108	409
1968	1	7	15	33	39	9	8	112	195	115	422
Change	–	–	1	(1)	–	–	–	–	2	–	2
1969	1	7	16	32	39	9	8	112	197	115	424

DEPARTMENT OF ADMINISTRATION

Office of the Deputy Director General

Grade	1967	1968	Change	1969
DDG	1	1	–	1
P-5	1	1	–	1
P-3	1	1	–	1
Subtotal	3	3	–	3
GS	2	2	–	2
Total	5	5	–	5

DIVISION OF BUDGET AND FINANCE

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	2	2	–	2
P-4	4	4	–	4
P-3	3	3	–	3
P-2	2	2	–	2
P-1	5	5	–	5
Subtotal	17	17	–	17
GS	21	22	1	23
Total	38	39	1	40

DIVISION OF CONFERENCE AND GENERAL SERVICES

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	2	2	–	2
P-4	1	1	–	1
P-3	2	2	–	2
P-2	3	3	–	3
P-1	2	2	–	2
Subtotal	11	11	–	11
GS	86	91	1	92
M&O	108	115	–	115
Total	205	217	1	218

DIVISION OF EXTERNAL LIAISON & PROTOCOL

Grade	1967	1968	Change	1969
D	2	2	–	2
P-5	3	4	–	4
P-4	1	1	–	1
P-3	1	–	–	–
P-2	1	1	–	1
Subtotal	8	8	–	8
GS	10	10	–	10
Total	18	18	–	18

DIVISION OF LANGUAGES

Grade	1967	1968	Change	1969
P-5	1	1	–	1
P-4	12	15	–	15
P-3	27	24	–	24
P-1	1	1	–	1
Subtotal	41	41	–	41
GS	38	38	–	38
Total	79	79	–	79

LEGAL DIVISION

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	2	2	–	2
P-4	1	2	–	2
P-3	2	1	–	1
P-2	1	1	–	1
Subtotal	7	7	–	7
GS	5	5	–	5
Total	12	12	–	12

DIVISION OF PERSONNEL

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	1	1	1	2
P-4	3	3	(1)	2
P-3	1	1	–	1
P-2	1	1	–	1
Subtotal	7	7	–	7
GS	16	16	–	16
Total	23	23	–	23

DIVISION OF PUBLIC INFORMATION

Grade	1967	1968	Change	1969
P-5	1	1	–	1
P-4	2	2	–	2
P-3	1	1	–	1
P-2	1	1	–	1
Subtotal	5	5	–	5
GS	6	6	–	6
Total	11	11	–	11

SECRETARIAT OF GENERAL CONFERENCE AND BOARD OF GOVERNORS

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	1	1	–	1
P-4	5	5	–	5
P-3	6	6	–	6
Subtotal	13	13	–	13
GS	5	5	–	5
Total	18	18	–	18

SUMMARY MANNING TABLE. DEPARTMENT OF RESEARCH AND ISOTOPES

Year	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	M&O	Total
1967	1	3	20	29	14	11	2	80	100	21	201
1968	1	3	20	34	14	11	2	85	110	22	217
Change	–	-	1	–	3	(1)	3	6	4	2	12
1969	1	3	21	34	17	10	5	91	114	24	229

DEPARTMENT OF RESEARCH AND ISOTOPES

Office of the Deputy Director General

Grade	1967	1968	Change	1969
DDG	1	1	–	1
P-3	1	1	–	1
P-1	1	1	–	1
Subtotal	3	3	–	3
GS	2	2	–	2
Total	5	5	–	5

JOINT FAO/IAEA DIVISION OF ATOMIC ENERGY IN FOOD AND AGRICULTURE

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	3	3	–	3
P-4	5	7	–	7
P-3	–	–	–	–
P-2	–	–	–	–
P-1	–	–	–	–
Subtotal	9	11	–	11
GS	6	7	–	7
Total	15	18	–	18

DIVISION OF RESEARCH AND LABORATORIES

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	5	5	1	6
P-4	6	7	–	7
P-3	5	5	2	7
P-2	2	3	–	3
P-1	–	–	–	–
Subtotal	19	21	3	24
GS	15	16	1	17
Total	34	37	4	41

DIVISION OF LIFE SCIENCES

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	5	5	–	5
P-4	6	6	–	6
P-3	1	1	–	1
P-2	–	–	–	–
P-1	–	–	2	2
Subtotal	13	13	2	15
GS	10	11	–	11
Total	23	24	2	26

THE AGENCY'S LABORATORY

Grade	1967	1968	Change	1969
P-5	5	5	–	5
P-4	8	10	–	10
P-3	6	6	1	7
P-2	8	7	(1)	6
P-1	1	1	–	1
Subtotal	28	29	–	29
GS	45	51	2	53
M&O	16	17	2	19
Total	89	97	4	101

THE TRIESTE CENTRE FOR THEORETICAL PHYSICS

Grade	1967	1968	Change	1969
P-5	1	1	–	1
P-4	1	1	–	1
P-3	1	1	–	1
P-2	1	1	–	1
P-1	–	–	–	–
Subtotal	4	4	–	4
GS	12	12	–	12
M&O	5	5	–	5
Total	21	21	–	21

THE MONACO LABORATORY

Grade	1967	1968	Change	1969
P-5	1	1	–	1
P-4	3	3	–	3
P-3	–	–	–	–
P-2	–	–	–	–
P-1	–	–	1	1
Subtotal	4	4	1	5
GS	10	11	1	12
M&O	–	–	–	–
Total	14	15	2	17

4. Department of Safeguards and Inspection

SUMMARY MANNING TABLE: DEPARTMENT OF SAFEGUARDS AND INSPECTION											
Year	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	M&O	Total
1967	1	1	5	5	1	1	1	15	9	–	24
1968	1	2	6	7	3	3	2	24	13	–	37
Change	–	–	4	4	1	1	–	10	5	–	15
1969	1	2	10	11	4	4	2	34	18	–	52

DEPARTMENT OF SAFEGUARDS AND INSPECTION				
Office of the Inspector General				
Grade	1967	1968	Change	1969
DDG	1	1	–	1
P-1	1	1	–	1
Subtotal	2	2	–	2
GS	–	–	–	–
Total	2	2	–	2

DIVISION OF SAFEGUARDS AND INSPECTION				
Grade	1967	1968	Change	1969
D	1	2	–	2
P-5	5	6	4	10
P-4	5	7	4	11
P-3	1	3	1	4
P-2	1	3	1	4
P-1	–	1	–	1
Subtotal	13	22	10	32
GS	9	13	5	18
Total	22	35	15	50

5. Department of Technical Assistance

SUMMARY MANNING TABLE: DEPARTMENT OF TECHNICAL ASSISTANCE											
Year	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	M&O	Total
1967	1	2	6	10	5	2	–	26	31	–	57
1968	1	2	6	10	5	2	–	26	31	–	57
Change	–	–	–	–	–	–	–	–	–	–	–
1969	1	2	6	10	5	2	–	26	31	–	57

DEPARTMENT OF TECHNICAL ASSISTANCE				
Office of the Deputy Director General				
Grade	1967	1968	Change	1969
DDG	1	1	–	1
P-5	1	1	–	1
P-4	1	1	–	1
P-3	1	1	–	1
P-2	1	1	–	1
P-1	–	–	–	–
Subtotal	5	5	–	5
GS	7	6	–	6
Total	12	11	–	11

PROGRAMME DIVISION				
Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	3	3	–	3
P-4	3	3	–	3
P-3	1	1	–	1
P-2	1	1	–	1
P-1	–	–	–	–
Subtotal	9	9	–	9
GS	9	8	–	8
Total	18	17	–	17

IMPLEMENTATION DIVISION				
Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	2	2	–	2
P-4	6	6	–	6
P-3	3	3	–	3
P-2	–	–	–	–
P-1	–	–	–	–
Subtotal	12	12	–	12
GS	15	17	–	17
Total	27	29	–	29

6. Department of Technical Operations

SUMMARY MANNING TABLE: DEPARTMENT OF TECHNICAL OPERATIONS

Year	DDG	D	P-5	P-4	P-3	P-2	P-1	Subtotal	GS	Total
1967	1	3	19	20	15	4	14	76	74	150
1968	1	3	21	23	15	6	15	84	88	172
Change	–	–	–	–	2	4	–	6	4	10
1969	1	3	21	23	17	10	15	90	92	182

DEPARTMENT OF TECHNICAL OPERATIONS

Office of the Deputy Director General

Grade	1967	1968	Change	1969
DDG	1	1	–	1
P-3	1	1	–	1
P-1	1	1	–	1
Subtotal	3	3	–	3
GS	2	2	–	2
Total	5	5	–	5

DIVISION OF HEALTH, SAFETY AND WASTE DISPOSAL

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	7	6	–	6
P-4	7	7	–	7
P-3	2	2	–	2
P-2	–	–	–	–
P-1	–	–	1	1
Subtotal	17	16	1	17
GS	9	10	1	11
Total	26	26	2	28

DIVISION OF NUCLEAR POWER AND REACTORS

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	9	11	–	11
P-4	6	7	–	7
P-3	3	2	–	2
P-2	1	1	1	2
P-1	1	1	–	1
Subtotal	21	23	1	24
GS	10	11	1	12
Total	31	34	2	36

DIVISION OF SCIENTIFIC AND TECHNICAL INFORMATION

Grade	1967	1968	Change	1969
D	1	1	–	1
P-5	3	4	–	4
P-4	7	9	–	9
P-3	9	10	2	12
P-2	3	5	3	8
P-1	12	13	(1)	12
Subtotal	35	42	4	46
GS	53	65	2	67
Total	88	107	6	113

ANNEX III

Draft resolutions

A. REGULAR BUDGET APPROPRIATIONS FOR 1969

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Regular Budget of the Agency for 1969 [1],

1. Appropriates an amount of $11 251 000 for the administrative expenses of the Agency in 1969, as follows:

	Section	US $
1.	Policy-making organs	568 500
2.	Panels and committees	200 000
3.	Seminars, symposia and conferences	145 000
4.	Distribution of information	206 000
5.	Scientific and technical services	1 035 000
6.	Salaries and wages	5 007 000
7.	Common staff costs	1 877 000
8.	Duty travel and missions	276 000
9.	Representation and hospitality	37 000
10.	Common services, equipment and supplies	795 500
11.	Operational facilities	974 000
	Sub-total	11 121 000
12.	Contigent extraordinary expenditures	130 000
	TOTAL	11 251 000

2. Decides that the foregoing appropriation shall be financed as follows:

(a) $200 000 from miscellaneous income, including refunds from the United Nations Joint Staff Pension Fund;

(b) $163 500 from the Special Account of the United Nations; and

(c) $10 887 500 from contributions by Member States on the basis of a scale of assessments to be determined by the General Conference, the contributions being adjusted pursuant to the Agency's Financial Regulations [2] to take account of the cash surplus for 1966;

3. Decides further that the Agency's administrative expenses in 1969 shall not exceed the sub-total of $11 121 000 given in paragraph 1 of this resolution, unless the Board of Governors decides that a need for additional, extraordinary expenditures has arisen;

4. Requests the Board, if it should so decide, to authorize the Director General to use, for the purpose of meeting that need, the funds appropriated for Section 12 up to the limit of $130 000; and

5. Authorizes the Director General:

(a) In respect of the Agency's publications, to incur expenditure additional to the US $128 000 for which provision is made under Section 4 of paragraph 1 above, provided that such expenditure is entirely financed from the proceeds of the sale of publications; 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(XII)/385.

[2] INFCIRC/8/Rev. 1.

B. OPERATIONAL BUDGET ALLOCATIONS FOR 1969

The General Conference,

(a) Accepting the recommendations of the Board of Governors relating to the Agency's operational programme for 1969 [1], and

(b) Noting that funds from various sources, estimated at US $512 000 are expected to be available for that programme,

1. Decides that for 1969 the target for voluntary contributions to the General Fund shall be US $2 million;

2. Urges all Member States to make voluntary contributions to the General Fund for 1969 in accordance with Article XIV. F of the Statute and with the terms of paragraphs 2 and 3 of its Resolution GC(V)/RES/100, so that this target may be reached;

Allocates the following sums for the Agency's operational programme in 1969;

	US $
Operating Fund I	673 000
Operating Fund II	1 839 000
	2 512 000

4. Authorizes the Director General to employ staff and incur other expenditure for the Laboratory in addition to that for which provision is made in the budget for 1969, provided that the emoluments of such staff and other costs are met from revenues arising out of work performed in the Laboratory for Member States, research grants, special contributions or other sources extraneous to the Regular and Operational Budgets for 1969.

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[1] GC(XII)/385

C. USE OF THE WORKING CAPITAL FUND IN 1969

The General Conference,

Accepting the recommendations of the Board of Governors relating to the use of the Agency's Working Capital Fund in 1969 [1],

1. Decides:

(a) That the Agency's Working Capital Fund shall remain at US $2 million in 1969; and

(b) That the Fund shall be financed, administered and used in 1969 in accordance with the relevant provisions of the Agency's Financial Regulations [2];

2. 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, 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;

3. Requests the Director General to submit to the Board periodic statements of advances made from the Fund under the authority given in paragraph 2 above; and

4. Urges Member States that have not yet done so to pay their advances to the Fund as soon as possible.

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[1] GC(XII)/385.

[2] INFCIRC/8/Rev. 1.