THE AGENCY'S PROGRAMME FOR 1983 - 1988 AND BUDGET FOR 1983

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INTERNATIONAL ATOMIC ENERGY AGENCY

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CONTENTS

LIST OF ABBREVIATIONS

ACABQ	Advisory Committee on Administrative and Budgetary Questions (of the General Assembly of the United Nations)
AG	Advisory Group
Agency	International Atomic Energy Agency
AGRIS	Agricultural Information System
BIPM	Bureau international des poids et mesures
CANDU	Canada deuterium-uranium [reactor]
CAS	Committee on Assurances of Supply
CCAQ	Consultative Committee on Administrative Questions
CEC	Commission of the European Communities
CINDA	Computer Index of Neutron Data
CMEA	Council for Mutual Economic Assistance
CRP	Co-ordinated research programme
DANIDA	Danish International Development Agency
DCS	Dipartimento per la Cooperazione allo Sviluppo
ECE	Economic Commission for Europe (of the United Nations)
ECOSOC	Economic and Social Council of the United Nations
EPPO	European and Mediterranean Plant Protection Organization
ESA	European Space Agency
ESNA	European Society for Nuclear Methods in Agriculture
EUCARPIA	European Association for Research on Plant Breeding
EURATOM	European Atomic Energy Community
EUSIDIC	European Association of Scientific Information Dissemination Centres
FAO	Food and Agriculture Organization of the United Nations
FBR	Fast breeder reactor
GS	General Service category (staff)
GSF	Gesellschaft für Strahlen- und Umweltforschung (Federal Republic of Germany)
HTGR HTR	High-temperature gas-cooled reactor
IAEA	International Atomic Energy Agency
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IBRD (World Bank)	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization

ICARDA	International Centre for Agricultural Research in the Dry Areas
ICIPE	International Centre for Insect Physiology and Ecology (Nairobi)
ICRISAT	International Crop Research Institute for the Semi-arid Tropics
ICRM	International Committee for Radionuclide Metrology
ICRP	International Commission on Radiological Protection
ICRU	International Commission on Radiation Units and Measurements
ICSC	International Civil Service Commission
ICSU	International Council of Scientific Unions
ICTP	International Centre for Theoretical Physics (at Trieste)
IEA	International Energy Agency
IEC	International Electrotechnical Commission
IEMVT	Institut d'élevage et de médecine vétérinaire tropicale
IFDC	International Fertilizer Development Centre
IFFIT	International Facility for Food Irradiation Technology
IFRC	International Fusion Research Council
IIASA	International Institute for Applied Systems Analysis
IITA	International Institute for Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILO	International Labour Organisation
ILRAD	International Laboratory for Research on Animal Disease
IMCO	Inter-Governmental Maritime Consultative Organization
INDC	International Nuclear Data Committee
INFCE	International Nuclear Fuel Cycle Evaluation
INIS	International Nuclear Information System
INTOR	International Tokamak Reactor
IOB	Inter-Organization Board for Information Systems
IOBC	International Organization for Biological Control of Noxious Animals and Plants
IPS	International Plutonium Storage
IRRI	International Rice Research Institute
ISFM	International Spent Fuel Management
ISNA	Indian Society for Nuclear Techniques in Agriculture and Biology
ISO	International Organization for Standardization

ISO/REMCO	Reference Materials Commission of the ISO
ISSS	International Soil Science Society
IUPAC	International Union of Pure and Applied Chemistry
Joint FAO/IAEA Division	Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy in Food and Agricultural Development
LMFBR	Liquid metal fast breeder reactor
LWR	Light-water reactor
M&O	Maintenance and Operatives Service category (staff)
Monaco Laboratory	International Laboratory of Marine Radioactivity (at Monaco)
NDA	Non-destructive assay
NDT	Non-destructive testing
NEA	Nuclear Energy Agency (of OECD)
NEANDC	Nuclear Energy Agency Nuclear Data Committee
NPT	Treaty on the Non-Proliferation of Nuclear Weapons (reproduced in document INFCIRC/140)
NUSS programme	Agency's programme on nuclear safety standards for nuclear power plants
OAU	Organization of African Unity
ODA	Overseas Development Administration (United Kingdom)
OECD	Organisation for Economic Co-operation and Development
OIML	International Organization of Legal Metrology
OPEC	Organization of the Petroleum Exporting Countries
P	Professional category (staff)
PNE	Nuclear explosions for peaceful purposes
RCA	Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
RL Series	IAEA-RL (Research and Laboratories) series of documents
SABRAO	Society for the Advancement of Breeding Research in Asia and Oceania
SAC	Scientific Advisory Committee
SAL	Safeguards Analytical Laboratory
SAREC	Swedish Agency for Research Co-operation with Developing Countries
SCOPE	Scientific Committee on Problems of the Environment
SIDA	Swedish International Development Authority
SIT	Sterile-insect technique

TC	Technical Committee
TECDOC	Document in Technical Documents Series
Tlatelolco Treaty	Treaty for the Prohibition of Nuclear Weapons in Latin America
Trieste Centre	International Centre for Theoretical Physics (at Trieste)
UNCNRET	United Nations Centre for Natural Resources, Energy and Transport
UNDP	United Nations Development Programme
UNDRO	Office of the United Nations Disaster Relief Co-ordinator
UN-DTCD	United Nations Department of Technical Co-operation for Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNIPEDE	International Union of Producers and Distributors of Electrical Energy
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
US-AID	United States Agency for International Development
USDA	United States Department of Agriculture
USDOE (USDE)	United States Department of Energy
VIC	Vienna International Centre
WASP	Wien Automatic System Planning Package
WEC	World Energy Conference
WHO	World Health Organization
WMO	World Meteorological Organization
World Bank (IBRD)	International Bank for Reconstruction and Development

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NOTE

All sums of money are expressed in United States dollars.

INTRODUCTION

General

1. In accordance with Article XIV.A of the Statute, the Board of Governors hereby submits to the General Conference the budget estimates for 1983, the preliminary estimates for 1984 and 1985 and the Agency's programme of work for the six-year period 1983-88. The Board requests the General Conference to adopt the draft resolutions set forth in Annex VII.

2. The estimates for 1984 and 1985 are based on conditions and trends as known now and are presented as preliminary estimates only. Final budget estimates for 1984 will be presented to the General Conference at its twenty-seventh regular session, with supporting programme explanations if significant changes have occurred. Adjustments to the preliminary figures may be necessary as a result of changes in programme emphasis or of factors outside the control of the Agency.

Format

3. The structure and presentation of the budget remain essentially the same as in the Agency's Programme for 1981-86 and Budget for 1981.

4. Two changes, however, may be noted. As a further step towards greater clarity of presentation, the estimates for Administration are given by organizational unit. Secondly, the Contracts Administration Section has been transferred from the Department of Administration to the Department of Research and Isotopes and the costs of Contract Services are now allocated along with those of Conference Services.

5. With the aim of providing Member States with more complete information about the written products of the Agency's programme, the scope of the summary tables at the end of certain chapters has been enlarged so as to include not only documents resulting from Technical Committees, Advisory Groups and consultants' meetings in 1983-84 but also all other documents (and major computer programs) that are expected to be prepared during this period. The entries under "Source" in the tables show any 1983-84 meetings involved in the production of the document: a blank in this column indicates that the Secretariat is entirely responsible for the preparation or that any meetings are outside the relevant period.

Programme trends

6. The "Technical Assistance and Co-operation" programme will continue to reflect the Agency's response to requests received from its Member States to the extent made feasible by funds available for this purpose. Submission of requests for large-scale and regional projects will be encouraged; in cases where its own funds would not be sufficient, the Agency intends to strengthen its efforts to assist Member States in finding additional sources of financing. With a view to securing increased funds, measures will be taken to ensure that donors of technical aid are better informed about the nature of the Agency's technical assistance projects. During 1983, development work will continue on the data processing and computer reporting system, which will also cover the administration of UNDP projects. The project evaluation procedures will be further developed on the basis of experience already gained.

7. Under "Nuclear Power", the priority areas will be those related to nuclear power programme planning and implementation, particularly for developing Member States. They will include: energy and electricity demand projections; electrical power system expansion planning and the role of nuclear power plants; manpower, local infrastructure and industrial development; and the technical planning of project-related activities. Consequently, improvements will continue to be made in methods for collecting and analysing energy demand and supply data, cost parameters and other relevant information. Case studies of the potential role of nuclear power in

the energy supply schemes of particular countries will be undertaken on request. Work in connection with nuclear power plant technology and operation will concentrate on engineering safety, quality assurance, operating experience and the analysis of plant performance for improvement of both plant safety and reliability. The current and potential applications of nuclear power for district heating and industrial processes will continue to be studied. Work related to advanced systems - such as fast breeders, advanced converters and fusion reactors, which offer the possibility of substantial improvements in energy resource utilization - will concentrate on important current issues, operating experience and progress in development programmes.

8. In the "Nuclear Fuel Cycle" area, the emphasis with nuclear materials will be shifted (as a result of the present uranium market conditions) towards programmes aimed at increasing the efficiency and improving the economics of mining and milling operations. The fuel technology programme will concentrate on improvements in the reliability of fuel elements and on quality control of fuel fabrication. Attention will also be given to the development of fuels for fast breeders and other advanced types of reactor. Technical support will be provided for the Committee on Assurances of Supply (CAS) and for any possible future discussions on regional fuel cycle centres. Waste management, being one of the most important issues related to the safe and long-term use of nuclear power, will continue to receive high priority, and the underground disposal programme will conclude its first phase with the publication of most of the planned documents on specific technological subjects. The entire programme on the technological, environmental, safety and regulatory aspects of managing all kinds of waste resulting from nuclear power and its fuel cycle will culminate in a major international conference in 1983. The development of a general methodology for assessing the environmental impact of nuclear facilities will be initiated.

9. In the expanded "Nuclear Safety" activities, an important feature will be the increased emphasis on encouraging and assisting Member States to implement the Agency's safety standards and guidance. These activities will be directed towards the codes and guides of the Nuclear Safety Standards (NUSS) programme (in which all documents in the areas of governmental organization and quality assurance will be completed in 1983-84 and the remaining documents in 1985), the recently revised Basic Safety Standards for Radiation Protection, the Regulations for the Safe Transport of Radioactive Materials and the guides being developed for emergency planning and preparedness. These documents, which are now used by the Secretariat for technical guidance, will provide the basis for the increasing number of Agency-sponsored safety missions, seminars and training courses. Documents dealing with various aspects of radiation protection will be revised to bring them in line with the new ICRP dose limitation system. A comprehensive review of the Transport Regulations will be completed and a new edition will be published in 1984. Activities in the field of nuclear emergency preparedness will be stepped up by the formulation of new technical guidance and training programmes and the organization of special missions. Recently initiated work on the collection and review of data concerning significant abnormal operating experience and on the promotion of international co-operation in safety research will become established so as to form important elements of the expanded nuclear safety programme. The newly initiated programme of assistance whereby safety-related computer codes are made available to developing countries for use on the Agency's computer will be expanded to include a greater number of codes and to cover a larger number of Member States. In the risk assessment area, increased emphasis will be placed on human factors engineering, which can play an important role in the safe operation of nuclear power plants.

10. The "Food and Agriculture" programme will continue to focus on areas where nuclear techniques have become established tools. The emphasis will be on technical co-operation projects, training and the co-ordination of research in Member States, the general aim being to help subsistence farmers and reduce the need for energy-intensive agricultural inputs. Research will be promoted on the development of cultural practices to reduce the fertilizer requirements of multiple cropping systems or pastures through improved fertilizer efficiency and nitrogen fixation. Work on mutation plant breeding for disease and pest resistance and on the sterile-insect technique will continue to help provide answers to the problem of high agricultural costs. The improvement of the reproductive performance of livestock, of the quality of their nutrition

and of the control of their diseases will continue to be areas of major concern, as will research aimed at optimizing the use of agricultural wastes and increasing the efficiency of pesticides. Work in connection with food irradiation will involve support for pilot-scale technological and economic studies aimed at establishing the feasibility of the method for reducing food losses in developing Member States, with the ultimate goal of promoting acceptance of the process and facilitating its commercialization.

11. In the "Life Sciences", it is planned to give priority to improving the quality control and cost effectiveness of radionuclide techniques used in the medical field in developing countries. Specific programmes will be concerned with the strategy for maintenance of nuclear medicine instruments and with guidance on the development and exchange of appropriate software. Several new co-ordinated research programmes will be started on topics relating to radioimmunoassay, the diagnosis of liver disease, stable-isotope tracers and occupational health. Assistance will continue to be given, with increased financial support from WHO, to the Secondary Standard Dosimetry Laboratories in Member States, their integration into the international measurement system and the provision of dose intercomparison services. A programme for high-dose dosimetry for industrial radiation processing will be further developed. Emphasis will be given to the development and promotion of techniques for the radiation sterilization of medical products (including tissue grafts) in developing Member States, with particular attention paid to the African and Middle East regions. Work on the development of radiometric tests and radiation-immobilized antigen techniques for epidemiological and diagnostic studies of parasitic diseases will be initiated, while the programme on radiation-attenuated vaccines will continue. In work connected with the assessment of environmental pollutants, the emphasis will be on the improvement of nuclear techniques and the provision of quality control. A new programme will be initiated on the improvement of the methodology for epidemiological studies of the health impact of low-level radiation.

12. The "Physical Sciences" programme will continue to be oriented towards the promotion of the practical use of radiation and nuclear technology in developing countries. The work in the field of industrial applications will be directed towards the development and transfer of technology and nuclear analytical methods for use in industrial processes and the development of natural resources. Research on radioactive and stable isotopes and their labelled compounds and on chemical aspects of fusion reactor technology will continue to be supported. The application of isotope techniques to the assessment of ground-water resources will receive major attention through technical co-operation programmes and through contracts with other organizations in the United Nations system. Training will remain an important element. The nuclear data programme will continue to place emphasis on the transfer of information and expertise to developing Member States. Work on the improvement of research reactor utilization will continue. The Tenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research will take place in 1984, reflecting the continuing role played by the Agency in co-ordinating world-wide efforts in this field. In this context, the Agency will continue to assist the work of Member States within the INTOR project.

13. The role of the Agency's Laboratory remains that of supporting the technical programmes of the Agency by assessing and demonstrating the feasibility of new projects, providing training in isotope and radiation techniques, and developing new methods which use these techniques. Emphasis will be maintained on the soil science, plant breeding and entomology activities of the Joint FAO/IAEA Division. The analytical quality control service offered by the Laboratory has received wide support: it will be strengthened and reorganized in accordance with the recommendations of a panel of experts. Work on radiation dosimetry will continue at about the present level. The Safeguards Analytical Laboratory will remain the Agency's main tool for analysing fuel cycle samples collected by safeguards inspectors. Its methods of measurement will be further refined, and improved facilities for data handling will be introduced.

14. At the International Centre for Theoretical Physics, research and training activities will continue in the fields of nuclear and plasma physics and high-energy and particle physics. Other subjects will include the physics of condensed matter and atomic, molecular and laser physics, with emphasis on

those aspects which lead to industrial and technological applications. Courses or meetings are also envisaged in other areas more directly related to contemporary needs, such as the physics of renewable energy sources, geophysics, biophysics, physics teaching and applicable mathematics. The principal aim will continue to be that of assisting physicists working in developing countries.

15. The agreement between the Agency, the Government of Monaco and the Oceanographic Institute at Monaco governing the operation of the International Laboratory of Marine Radioactivity will remain in effect until 30 June 1984. During this period, the difficulties caused by the lack of adequate laboratory space are expected to be resolved and new premises secured. Within the reorientated programme of the Monaco Laboratory, the primary emphasis will be on research relevant to the protection of the marine environment against the effects of possible disposal of radioactive wastes on or in the seabed. Training in marine environmental studies will continue to be provided. The Laboratory will act as the international centre for quality control in radioactivity measurements in the oceans and will develop co-ordinated research programmes with national laboratories throughout the world. It is anticipated that the Laboratory's unique capabilities will continue to be sought by other international organizations. Research will be carried out on the environmental impacts on the oceans of released radionuclides and naturally occurring isotopes. Intercomparisons will be made within the framework of the Agency's Baltic Sea project. Involvement in the evaluation of marine radioactive waste disposal options will continue through participation in Agency and NEA task groups and in the development of a co-ordinated research programme.

16. Under the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) for the Far East and South East Asia and the Pacific, eight projects are now in progress. In addition, a large-scale UNDP project on the Industrial Application of Radioisotopes and Radiation comes into effect on 1 April 1982. The main objective of RCA is to foster technical co-operation between developing countries in the fields of food and agriculture, health-related environmental research, water resource management, industrial applications, materials sciences and nuclear instrument maintenance. It is planned to establish a second Regional Co-operative Agreement in the Latin American region, subject to the positive outcome of negotiations now under way.

17. In "Safeguards", the next biennium will be marked by both innovation and consolidation. A trainee inspector programme will be introduced to meet the growing need for new methods to replenish the ranks of the inspectorate. The scheme for using General Service staff inspectors has demonstrated its success and will be consolidated. New personnel management methods will be introduced, especially in the area of recruitment. In the field of containment and surveillance, it is expected that the first steps will be taken to replace much of the existing standard commercial equipment by a second generation of equipment which is designed specifically for safeguards purposes and from which significantly improved results can be expected. A number of other items of equipment, especially in the area of NDA, will be tested and put to increasing field use. The many quantitative as well as qualitative developments in safeguards which have taken place in recent years have led to a reappraisal of the ways in which reports on inspections are produced and analysed. This process will continue, with revision of the format and content of inspection reports and the development of methods for computerizing them for maximum flexibility and feedback.

18. To ensure greater managerial efficiency and a more rational use of the staff in the operational sections of the Safeguards Department, it is planned to re-group the inspectorate into three Divisions. (The present structure with two Operations Divisions was established in 1977; since then, the inspectorate staff has more than doubled and the regional sections have grown very unevenly.) The existing regional sections would be grouped in such a way that the large sections in Divisions A and C containing functional units (responsible for particular types of facility) would be able to provide

support during "peak-load" periods for smaller sections in the same Divisions. The structure would be as follows:

Division of Operations A:	Far East Section and South and South East Section
Division of Operations B:	North America Section and Central and Northern Europe Section
Division of Operations C:	Euratom Section and Africa and Latin Section.

19. Furthermore, it is planned to establish a Division of Safeguards Evaluation by pooling the present Section of Safeguards Evaluation (to be split into a Section for Effectiveness Evaluation and a Section for Quality Assurance) and the Section of Data Evaluation Services.

20. Finally, smaller units (Section for Standardization and Administrative Support, Safeguards Training Section and Administrative Officer), which presently report directly to the Deputy Director General, would be combined into a Division for Standardization, Training and Administrative Support.

21. Existing P-5 posts would be upgraded to the D level for the Directors of the new Divisions; the costs involved in the upgrading would be very modest.

22. The "Information and Technical Services" programme will continue its efforts to provide more effective computer and information services to the Member States and the organizations in the VIC. In the INIS sub-programme, the trends will be for increased participation in data base networks, further development of computerized multilingual versions of the official INIS Thesaurus and new experiments leading to procedures for direct transmission of bibliographic input to Vienna using telecommunications networks. These experiments will also include electronic transmission of the output data base to Member States. The scope of INIS training will be expanded to include such subjects as the management of information services and the establishment of an information infrastructure. In the Library, which provides a service to the entire VIC on a cost-sharing basis, the trends will include increased computerization for systems management and expanded use of data bases held in the libraries of other institutions. It is expected that more use will be made of external commercial data bases via telecommunications networks. The Computer Service, which is also a common service for the entire VIC, will continue to show an increase, with growing emphasis on smaller computers located within user organizations but connected to the central complex. There will also be an increase in the number of Member States availing themselves of the data bases stored in the Agency's computers (via communications links). The increasing use of word processors will continue. Because of the growing involvement of Member States in fusion research, the monthly Nuclear Fusion journal will consider articles on a broader range of topics than in the past.

Adjustments made in the budget estimates and manning table for 1982

23. Since the Agency's budget for 1982 was approved, various actions affecting the budget estimates for the different programmes have been taken. In order to permit a meaningful comparison with the 1983 estimates, a "1982 Adjusted Budget" has been drawn up. The considerations underlying the adjustments are set out below.

24. The initial programme cost estimates of $98 989 000 for 1982 were based on an exchange rate of 12.90 Austrian schillings to the United States dollar. Because of the substantial increase in the dollar/schilling exchange rate, an amount of $12 620 000 has been deducted for the adjustment of the programme cost estimate in order to compensate for an assumed average exchange rate of 15.50 schillings to the dollar in 1982.

25. The sum of $12 620 000 has been allocated so as to show the impact on the various programmes of the assumption that the average exchange rate in

1982 will prove to be 15.50 schillings to the dollar. All other changes represent transfers of posts and of the associated costs between programmes within the manning table and the budget estimates approved for 1982; in particular, mention may be made of the re-organization within the Department of Safeguards (see paragraphs 18-21) and the transfer of the Contracts Administration Section from the Department of Administration to the Department of Research and Isotopes.

The Regular Budget for 1983

26. The total of the Regular Budget estimates for 1983 as shown in the Consolidated Budget, Table 1, is $92 821 000, an increase of 7.5% over the 1982 level. The Regular Budget by programme is shown in Table 2 and the Regular Budget by item of expenditure in Table 3.

27. The budget estimates for the individual programmes are based on an exchange rate of 15.50 Austrian schillings to the United States dollar; they can, therefore, be compared directly with the adjusted budget estimates for 1982, which are also based on that rate.

28. Because of the increase in the dollar/schilling exchange rate during recent months, however, an amount of $3 596 000 has been deducted for the adjustment of programme cost estimates - in order to compensate for an assumed average rate of AS 16.30 to the dollar in 1983. The draft resolution on the Regular Budget appropriations for 1983 as contained in Annex VII is accordingly based on the assumed exchange rate of AS 16.30 to the dollar. The budget document for the 1984 estimates will contain a "1983 Adjusted Budget" column based on an exchange rate of AS 16.30 to the dollar, if appropriate.

29. Table 2 shows the budget estimates for the Agency's programmes and the cost of work for others. The programme cost estimates for 1983 are directly comparable with the adjusted programme cost estimates for 1982. The increase for the Agency's programme in 1983 over the 1982 level is $10 019 000, or 12.1%. The 12.1% is made up as follows: 9.6% for price increases attributable to inflation and 2.5% for a net programme increase. After deduction of the "Adjustment of programme cost estimates" of $3 596 000, the Regular Budget for 1983 is $92 821 000, an increase of $6 452 000 or 7.5% compared to the 1982 Regular Budget.

30. Table 3 shows the Regular Budget by item of expenditure. Programme decreases occur in "Travel", "Technical committees and advisory groups", "Scientific and technical contracts" and "Common services, supplies and equipment". All other items of expenditure show a programme increase.

31. With regard to price increases, a detailed study has been made of the effects of inflation on the budget estimates for each item of expenditure. On the basis of this study, it is expected that the overall price increase in 1983 over the 1982 level will be 9.6%, as noted above. After deduction of the "Adjustment of programme cost estimates" of $3 596 000 to reflect the assumed appreciation of the United States dollar from AS 15.50 for 1982 to AS 16.30 for 1983, there will be a net price increase of 5.5% compared with the budget for 1982.

32. It is proposed that the Regular Budget estimates for 1983 of $92 821 000 be funded by an estimated income of $10 587 000 plus an assessment on Member States of $82 234 000. The assessment for 1983 is an increase over the assessment for 1982 of $4 890 000, or 6.3%. The increase results from a 5.2% price increase and a 1.1% programme increase.

Extrabudgetary resources

33. As in the previous budget document, information is provided on the total extrabudgetary resources expected to be available to the Agency for carrying out its programme in 1983 (see Tables 1 and 5).

34. The dollar amounts for extrabudgetary resources are tentative and represent the best estimates that can be made at present. Some amounts represent requests made by the Agency and some are reasonable expectations based on past experience; several are still subject to confirmation.

Target for voluntary contributions to the Technical Assistance and Co-operation Fund

35. The provision of technical assistance by the Agency to its developing Member States is financed from the Technical Assistance and Co-operation Fund, which receives its income mainly in the form of voluntary contributions for which a target is set each year. The Board agreed to recommend that the target for 1983 be established at $19 million.

Working Capital Fund

36. The Board recommends that for 1983 the Agency's Working Capital Fund remain at the same level as for 1982, namely $2 million. The recommendation is reflected in draft resolution C set forth in Annex VII. In order to preclude the need to increase the level of the Working Capital Fund, Member States are urged to make every effort to pay their contributions promptly. There is naturally some concern about the long-term implications of a continuing delay in payment of contributions, which could rapidly result in the depletion of the Working Capital Fund.

Report on the budget to the General Assembly of the United Nations

37. In accordance with Article XVI of the Agency's relationship agreement with the United Nations [1], the budget will be reviewed by ACABQ, which will report on the administrative aspects thereof to the General Assembly of the United Nations.

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[1] INFCIRC/11, Part I.

THE CONSOLIDATED BUDGET - 1983

Table 1

Programme		Regular Budget	Technical Assistance and Co-operation Fund	Extrabudgetary		
				Australia	Canada	Germany F.R.
A.	Technical assistance and co-operation	4 383 000	20 000 000	-	-	400 000
B.	Nuclear power	3 143 000	-	-	-	-
C.	Nuclear fuel cycle	3 110 000	-	-	-	-
D.	Nuclear safety	5 301 000	-	-	-	-
E.	Nuclear explosions for peaceful purposes	13 000	-	-	-	-
F.	Food and agriculture	4 165 000	-	-	-	76 000
G.	Life sciences	3 092 000	-	-	-	-
H.	Physical sciences	6 100 000	-	385 000	-	95 000
J.	International Centre for Theoretical Physics	1 185 000	-	-	-	20 000
K.	International Laboratory of Marine Radioactivity	1 192 000	-	-	-	-
L.	Safeguards	30 943 000	-	80 000	200 000	200 000
M.	Information and technical services	4 748 000	-	-	-	-
N.	Policy-making organs	3 218 000	-	-	-	-
O.	Executive management and technical programme planning	1 695 000	-	-	-	-
P.	Administration	8 903 000	-	-	-	-
Q.	General services	11 487 000	-	-	-	-
S.	Cost of work for others	3 739 000 e/	-	-	-	-
T.	Adjustment of programme cost estimates	(3 596 000)	-	-	-	-
	TOTAL	92 821 000	20 000 000	465 000	200 000	791 000
	Source of Funds					
	Assessment on Member States	82 234 000	-	-	-	-
	Voluntary contributions	-	19 000 000	-	-	-
	Extrabudgetary resources	-	-	465 000	200 000	791 000
	Income from work for others	3 552 000 f/	-	-	-	-
	Other miscellaneous income	7 035 000	1 000 000	-	-	-
	TOTAL	92 821 000	20 000 000	465 000	200 000	791 000

a/ In addition to the above indicated cash resources, Member States make contributions in kind, consisting of cost-free experts and consultants, stipends for fellowships, training courses and other.
b/ UNDP $4 500 000, FSSTD $150 000, Denmark $70 000, Finland $100 000.
c/ UNESCO $400 000; OPEC $100 000, Denmark $13 000, Kuwait $ 50 000, FSSTD $200 000, other $316 000.
d/ Principality of Monaco $135 000, UNEP $100 000.
e/ Unadjusted, at AS 15.50 to 1 US dollar.
f/ Adjusted, at AS 16.30 to 1 US dollar.

Resources (excluding contributions in kind)[a]								TOTAL
Italy	Japan	Sweden	United Kingdom	USA	USSR	Other	Sub-total	
2 851 000	50 000	250 000	250 000	1 200 000	-	4 820 000[b]	9 821 000	34 204 000
-	-	-	-	-	-	-	-	3 143 000
-	-	-	-	-	-	-	-	3 110 000
-	-	-	-	120 000	-	-	120 000	5 421 000
-	-	-	-	-	-	-	-	13 000
260 000	80 000	210 000	-	35 000	-	-	661 000	4 826 000
-	-	-	-	20 000	-	-	20 000	3 112 000
-	190 000	-	-	-	-	-	670 000	6 770 000
2 400 000	24 000	200 000	-	100 000	-	1 079 000[c]	3 823 000	5 008 000
-	-	-	-	-	-	235 000[d]	235 000	1 427 000
-	300 000	-	100 000	1 500 000	300 000	-	2 680 000	33 623 000
-	-	-	-	-	-	-	-	4 748 000
-	-	-	-	-	-	-	-	3 218 000
-	-	-	-	-	-	-	-	1 695 000
-	-	-	-	-	-	-	-	8 903 000
-	-	-	-	-	-	-	-	11 487 000
-	-	-	-	-	-	-	-	3 739 000
-	-	-	-	-	-	-	-	(3 596 000)
5 511 000	644 000	660 000	350 000	2 975 000	300 000	6 134 000	18 030 000	130 851 000
-	-	-	-	-	-	-	-	82 234 000
-	-	-	-	-	-	-	-	19 000 000
5 511 000	644 000	660 000	350 000	2 975 000	300 000	6 134 000	18 030 000	18 030 000
-	-	-	-	-	-		-	3 552 000
-	-	-	-	-	-	-	-	8 035 000
5 511 000	644 000	660 000	350 000	2 975 000	300 000	6 134 000	18 030 000	130 851 000

TOTAL RESOURCES - 1983 [a/]

Table 1a

Programme	Regular Budget Estimate	Technical Assistance and Co-operation Fund	Extra-budgetary Resources	TOTAL
	$	$	$	$
A. Technical Assistance and Co-operation	4 201 000	20 000 000	9 821 000	34 022 000
B. Nuclear Power	3 022 000	-	-	3 022 000
C. Nuclear Fuel Cycle	3 000 000	-	-	3 000 000
D. Nuclear Safety	5 111 000	-	120 000	5 231 000
E. Nuclear Explosions for Peaceful Purposes	13 000	-	-	13 000
F. Food and Agriculture	4 026 000	-	661 000	4 687 000
G. Life Sciences	2 997 000	-	20 000	3 017 000
H. Physical Sciences	5 869 000	-	670 000	6 539 000
J. International Centre for Theoretical Physics	1 177 000	-	3 823 000	5 000 000
K. International Laboratory of Marine Radioactivity	1 145 000	-	235 000	1 380 000
L. Safeguards	29 899 000	-	2 680 000	32 579 000
M. Information and Technical Services	4 563 000	-	-	4 563 000
N. Policy-making Organs	3 094 000	-	-	3 094 000
O. Executive Management and Technical Programme Planning	1 629 000	-	-	1 629 000
P. Administration	8 536 000	-	-	8 536 000
Q. General Services	10 987 000	-	-	10 987 000
S. Cost of Work for Others	3 552 000	-	-	3 552 000
	92 821 000	20 000 000	18 030 000	130 851 000
Source of Funds				
Assessment on Member States	82 234 000	-	-	82 234 000
Voluntary Contributions	-	19 000 000	-	19 000 000
Extrabudgetary Resources	-	-	18 030 000	18 030 000
Income from Work for Others	3 552 000	-	-	3 552 000
Other Miscellaneous Income	7 035 000	1 000 000	-	8 035 000
TOTAL	92 821 000	20 000 000	18 030 000	130 851 000

a/ At AS 16.30 to 1 US dollar.

THE REGULAR BUDGET

By item of expenditure

Table 2

	Programme	1982 Adjusted Budget	Price
A.	Technical Assistance and Co-operation (Regular Budget)	3 877 000	343 000
B.	Nuclear Power	2 866 000	227 000
C.	Nuclear Fuel Cycle	2 787 000	264 000
D.	Nuclear Safety	4 762 000	464 000
E.	Nuclear explosions for peaceful purposes	12 000	700
F.	Food and agriculture	3 926 000	306 000
G.	Life sciences	2 887 000	240 000
H.	Physical sciences	5 737 000	514 000
J.	International Centre for Theoretical Physics (Regular Budget)	1 179 000	94 000
K.	International Laboratory of Marine Radioactivity (Regular Budget)	1 208 000	(12 000)
L.	Safeguards	25 700 000	2 832 000
M.	Information and technical services	4 410 000	378 700
N.	Policy-making organs	2 694 000	244 000
O.	Executive management and technical programme planning	1 523 000	101 000
P.	Administration	7 944 000	631 600
Q.	General services	11 147 000	1 338 000
	Agency programmes	82 659 000	7 966 000
S.	Cost of work for others	3 710 000	307 000
	Sub-total	86 369 000	8 273 000
T.	Adjustment of programme cost estimates	-	(3 596 000)
Regular Budget		86 369 000[a/]	4 677 000
Less:	Miscellaneous income		
	Income from work for others	3 710 000[a/]	120 000
	Other	5 315 000	510 000
Assessment on Member States		77 344 000[a/]	4 047 000

a/ Based on an exchange rate of AS 15.50.
b/ Based on an exchange rate of AS 16.30.

Increase or (decrease) from 1982					1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
%	Programme	%	Total	%			
8.9	163 000	4.2	506 000	13.1	4 383 000	4 871 000	5 374 000
7.9	50 000	1.8	277 000	9.7	3 143 000	3 713 000	3 936 000
9.5	59 000	2.1	323 000	11.6	3 110 000	3 512 000	3 848 000
9.7	75 000	1.6	539 000	11.3	5 301 000	6 084 000	6 397 000
5.8	300	2.5	1 000	8.3	13 000	38 000	66 000
7.8	(67 000)	(1.7)	239 000	6.1	4 165 000	4 647 000	4 995 000
8.3	(35 000)	(1.2)	205 000	7.1	3 092 000	3 323 000	3 662 000
8.9	(151 000)	(2.6)	363 000	6.3	6 100 000	6 693 000	7 102 000
8.0	(88 000)	(7.5)	6 000	0.5	1 185 000	1 190 000	1 195 000
(1.0)	(4 000)	(0.3)	(16 000)	(1.3)	1 192 000	1 308 000	1 406 000
11.0	2 411 000	9.4	5 243 000	20.4	30 943 000	37 014 000	41 693 000
8.6	(40 700)	(0.9)	338 000	7.7	4 748 000	5 384 000	5 989 000
9.0	280 000	10.2	524 000	19.2	3 218 000	3 684 000	3 828 000
6.7	71 000	4.7	172 000	11.4	1 695 000	1 888 000	2 050 000
7.9	327 400	4.1	959 000	12.0	8 903 000	10 312 000	11 122 000
12.0	(998 000)	(8.9)	340 000	3.1	11 487 000	12 693 000	13 859 000
9.6	2 053 000	2.5	10 019 000	12.1	92 678 000	106 354 000	116 522 000
8.3	(278 000)	(7.5)	29 000	0.8	3 739 000[a]	4 022 000[a]	4 587 000[a]
9.6	1 775 000	2.0	10 048 000	11.6	96 417 000[a]	110 376 000[a]	121 109 000[a]
-	-	-	(3 596 000)	-	(3 596 000)	(4 117 000)	(4 517 000)
5.5	1 775 000	2.0	6 452 000	7.5	92 821 000[b]	106 259 000[b]	116 592 000[b]
3.2	(278 000)	(7.5)	(158 000)	(4.3)	3 552 000[b]	3 825 000[b]	4 362 000[b]
9.6	1 210 000	22.8	1 720 000	32.4	7 035 000	7 155 000	7 365 000
5.2	843 000	1.1	4 890 000	6.3	82 234 000[b]	95 279 000[b]	104 865 000[b]

THE REGULAR BUDGET

By item of expenditure

Table 3

Item of expenditure	1981 Actual obligations	1982 Adjusted Budget	Price
Salaries and wages			
Established posts	36 452 308	42 163 000	3 412 000
Consultants	728 344	967 700	67 600
Overtime	168 080	148 400	11 800
Temporary assistance	569 927	539 000	41 900
Sub-total	37 918 659	43 818 100	3 533 300
Common staff costs	12 953 546	13 070 900	1 517 100
Travel	2 133 010	3 267 100	349 600
Meetings			
Conferences, symposia, seminars	659 474	848 000	63 000
Technical committees, advisory groups	985 446	1 435 000	145 300
Representation and hospitality	90 762	118 400	6 600
Scientific and technical contracts	2 165 059	3 215 000	215 700
Scientific supplies and equipment	1 422 897	2 036 500	263 200
Common services, supplies and equipment	12 785 640	13 727 000	1 781 000
Other items of expenditure	866 301	1 123 000	91 200
Agency programmes	71 980 794	82 659 000	7 966 000
Cost of work for others	3 038 195	3 710 000	307 000
Sub-total	75 018 989	86 369 000	8 273 000
Adjustment of programme cost estimates	-	-	(3 596 000)
Total Regular Budget	75 018 989	86 369 000[a/]	4 677 000

a/ Based on an exchange rate of AS 15.50.
b/ Based on an exchange rate of AS 16.30.

Increase or (decrease) from 1982					1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
%	Programme	%	Total	%			
8.1	219 000	0.5	3 631 000	8.6	45 794 000	52 069 000	57 147 000
7.1	107 700	11.4	175 300	18.5	1 143 000	1 227 200	1 278 700
7.6	19 200	9.9	31 000	17.5	179 400	235 500	238 900
7.7	62 700	12.0	104 600	19.7	643 600	891 600	689 200
8.1	408 600	0.9	3 941 900	9.0	47 760 000	54 423 300	59 353 800
11.6	69 000	0.5	1 586 100	12.1	14 657 000	16 660 600	18 289 200
10.7	(117 900)	(3.6)	231 700	7.1	3 498 800	4 278 400	4 749 900
7.4	88 000	10.4	151 000	17.8	999 000	1 171 000	1 351 000
10.1	(164 300)	(11.4)	(19 000)	(1.3)	1 416 000	1 975 000	2 040 000
5.6	-	-	6 600	5.6	125 000	150 200	154 600
6.7	(85 700)	(2.7)	130 000	4.0	3 345 000	3 771 500	4 110 500
12.9	2 364 200	116.1	2 627 400	129.0	4 663 900	6 045 500	7 142 500
12.9	(772 300)	(5.6)	1 008 700	7.3	14 735 700	16 355 800	17 776 200
8.1	263 400	23.5	354 600	31.6	1 477 600	1 522 700	1 554 300
9.6	2 053 000	2.5	10 019 000	12.1	92 678 000	106 354 000	116 522 000
8.3	(278 000)	(7.5)	29 000	0.8	3 739 000	4 022 000	4 587 000
9.6	1 775 000	2.0	10 048 000	11.6	96 417 000[a/]	110 376 000[a/]	121 109 000[a/]
	-		(3 596 000)		(3 596 000)	(4 117 000)	(4 517 000)
5.5	1 775 000	2.0	6 452 000	7.5	92 821 000[b/]	106 259 000[b/]	116 592 000[b/]

Summary of income

Table 4

Item	1981 Actual
Assessed contributions on Member States	67 981 315
Miscellaneous income	
(a) Income from work for others	
Data processing services	972 275
Printing services	926 885
Medical services	358 050
Library services	735 596
Sub-total	2 992 806
(b) Attributable to specific programmes	
Publications of the Agency	673 993
INIS publications including microfiches	414 086
CINDA publications	26 864
Advertising	17 320
Laboratory income	89 444
Sales of surplus property	131 609
Amounts recoverable under safeguards agreements from non-member States	113 573
UNDP programme support cost	992 444
SIDA programme support cost	49 910
Other programme support cost	17 465
Sub-total	2 526 708
(c) Not attributable to specific programmes	
Investment and interest income	4 450 027
Refund from the United Nations Joint Staff Pension Fund	183 507
Refund of Value Added Tax	188 997
Other	370 737
Sub-total	5 193 268
Total miscellaneous income	10 712 782
TOTAL	78 694 097

a/ Based on an exchange rate of AS 15.50.
b/ Based on an exchange rate of AS 16.30.

1982 Budget[a]	Increase or (decrease) over 1982	1983 Estimate[b]	1984 Preliminary estimate[b]	1985 Preliminary estimate[b]
77 344 000	4 890 000	82 234 000	95 279 000	104 865 000
1 473 000	(184 000)	1 289 000	1 354 000	1 702 000
1 171 000	(74 000)	1 097 000	1 196 000	1 281 000
343 000	36 000	379 000	405 000	432 000
723 000	64 000	787 000	870 000	947 000
3 710 000	(158 000)	3 552 000	3 825 000	4 362 000
880 000	-	880 000	900 000	920 000
500 000	50 000	550 000	570 000	590 000
25 000	5 000	30 000	30 000	30 000
25 000	-	25 000	25 000	25 000
105 000	5 000	110 000	130 000	150 000
5 000	45 000	50 000	55 000	60 000
80 000	120 000	200 000	230 000	250 000
1 000 000	100 000	1 100 000	1 100 000	1 200 000
30 000	(30 000)	-	-	-
-	-	-	-	-
2 650 000	295 000	2 945 000	3 040 000	3 225 000
2 165 000	1 335 000	3 500 000	3 500 000	3 500 000
150 000	40 000	190 000	195 000	200 000
-	-	-	-	-
350 000	50 000	400 000	420 000	440 000
2 665 000	1 425 000	4 090 000	4 115 000	4 140 000
9 025 000	1 562 000	10 587 000	10 980 000	11 727 000
86 369 000	6 452 000	92 821 000	106 259 000	116 592 000

EXTRABUDGETARY RESOURCES 1981-1983 Table 5 (excluding contributions in kind)[a/]

		1981 Actual obligations	1982 Estimate	1983 Estimate
A.	Technical assistance and co-operation[b/]			
	UNDP	5 068 271	4 500 000	4 500 000
	Financing System for Science and Technology Development	-	250 000	150 000
	Belgium	68 800	69 000	-
	Canada	8 408	57 000	-
	Denmark	47 092	12 000	70 000
	Federal Republic of Germany	337 976	968 000	400 000
	Finland	108 975	137 000	100 000
	Italy	-	5 102 000[c/]	2 851 000
	Japan	-	111 000	50 000
	Saudi Arabia	-	50 000	-
	Sweden	560 744	1 408 000	250 000
	Union of Soviet Socialist Republics	24 186	58 000	-
	United Kingdom of Great Britain and Northern Ireland	51 235	449 000	250 000
	United States of America	1 443 464	2 453 000	1 200 000
	Sub-total	7 719 151	15 624 000	9 821 000
B.	Nuclear power			
	Federal Republic of Germany	56 521	-	-
	Sub-total	56 521	-	-
C.	Nuclear fuel cycle			
	NEA/OECD	63 528	26 000	-
	Federal Republic of Germany	20 690	-	-
	United States of America	45 647	45 000	-
	Sub-total	129 865	71 000	-
D.	Nuclear safety			
	United States of America	90 776	110 000	120 000
	Finland	-	120 000	-
	Sub-total	90 776	230 000	120 000
F.	Food and agriculture			
	Federal Republic of Germany	115 407	90 000	76 000
	Italy	-	520 000	260 000
	Japan (RCA)	64 000	80 000	80 000
	Sweden	252 090	210 000	210 000
	United States of America	-	90 000	35 000
	Sub-total	431 497	990 000	661 000
G.	Life sciences			
	UNEP	30 929	-	-
	United States of America	608	20 000	20 000
	Sub-total	31 537	20 000	20 000
H.	Physical sciences			
	Australia (RCA)	51 370	72 000	385 000
	Federal Republic of Germany	162 268	107 000	95 000
	Japan (RCA)	40 336	100 000	190 000
	United States of America	102 761	60 000	-
	Sub-total	356 735	339 000	670 000

a/ In addition to the above indicated cash resources, Member States make contributions in kind consisting of cost-free experts and consultants, stipends for fellowships, training courses and other.

b/ Figures for 1982 represent unobligated balances available 1 January 1982 plus new contributions made and/or expected during 1982. Figures for 1983 contain estimates of new funds only.

c/ $4 000 000 under consideration.

Table 5 (cont.)

		1981 Actual obligations	1982 Estimate	1983 Estimate
I.	International Centre for Theoretical Physics			
	Financing System for Science and Technology Development	-	270 000	200 000
	UNESCO	385 000	400 000	400 000
	Canada	-	36 000	-
	Denmark	11 232	13 000	13 000
	Federal Republic of Germany	20 492	20 000	20 000
	Italy	1 557 769	1 248 000	2 400 000
	Japan	15 549	24 000	24 000
	Kuwait	-	-	50 000
	Netherlands	50 000	50 000	-
	Sweden	65 934	53 000	200 000
	United States of America	116 000	100 000	100 000
	Other	80 602	130 000	316 000
	OPEC	100 000	100 000	100 000
	Sub-total	2 402 578	2 444 000	3 823 000
K.	International Laboratory of Marine Radioactivity			
	UNEP	112 509	200 000	100 000
	Federal Republic of Germany	70 145	36 000	-
	Principality of Monaco	85 964	-	135 000
	Sub-total	268 618	236 000	235 000
L.	Safeguards			
	Australia	29 238	30 000	80 000
	Canada	179 009	49 000	200 000
	Federal Republic of Germany	45 740	200 000	200 000
	Japan	29 493	200 000	300 000
	Union of Soviet Socialist Republics	-	300 000	300 000
	United Kingdom of Great Britain and Northern Ireland	-	30 000	100 000
	United States of America	1 409 391	1 500 000	1 500 000
	Sub-total	1 692 871	2 309 000	2 680 000
P.	Administration			
	International Plutonium Storage			
	Argentina	2 963	-	-
	Australia	17 550	-	-
	Denmark	2 812	-	-
	Federal Republic of Germany	70 000	-	-
	Finland	3 000	-	-
	Italy	15 000	-	-
	Japan	33 628	42 000	-
	Pakistan	262	-	-
	Spain	15 000	-	-
	United Kingdom of Great Britain and Northern Ireland	65 000	-	-
	Sub-total	225 215	42 000	-
	International Spent Fuel Management			
	Argentina	790	-	-
	Denmark	750	-	-
	Finland	1 000	-	-
	Italy	4 000	-	-
	Pakistan	100	-	-
	Switzerland	1 200	-	-
	United States of America	70 831	-	-
	Sub-total	78 671	-	-
	Total, Administration	303 886	42 000	-
TOTAL		13 484 035	22 305 000	18 030 000

T H E P R O G R A M M E B U D G E T

A. TECHNICAL ASSISTANCE AND CO-OPERATION

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table A.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 106 719
Consultants	41 135
Overtime	1 784
Temporary assistance	52 415
Sub-total	2 202 053
Common staff costs	752 589
Travel	35 513
Representation and hospitality	682
Common services, supplies and equipment	8 697
Transfer of costs:	
Translation and records services	226 237
Printing and publishing services	102 006
Data processing services	95 133
TOTAL	3 422 910

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 401 000	189 000	96 000	285 000	2 686 000	3 031 000	3 317 000
12 500	900	5 300	6 200	18 700	19 800	21 000
2 500	200	(200)	-	2 500	2 700	3 000
37 500	3 000	20 100	23 100	60 600	35 500	39 700
2 453 500	193 100	121 200	314 300	2 767 800	3 089 000	3 380 700
743 900	84 700	31 000	115 700	859 600	969 900	1 061 000
88 900	9 500	(4 800)	4 700	93 600	95 000	100 000
1 200	100	(200)	(100)	1 100	1 200	1 300
6 500	600	5 800	6 400	12 900	13 900	15 000
275 000	26 000	(7 000)	19 000	294 000	330 000	368 000
134 000	12 000	6 000	18 000	152 000	166 000	188 000
174 000	17 000	11 000	28 000	202 000	206 000	260 000
3 877 000	343 000	163 000	506 000	4 383 000	4 871 000	5 374 000

SUMMARY OF MANPOWER

Table A.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	9	9	9	1	10	10	10
P-4	11	11	10	-	10	11	11
P-3	8	8	8	-	8	8	8
P-2	4	6	6	1	7	7	7
Sub-total	33	35	34	2	36	37	37
GS	42	44	44	2	46	48	50
TOTAL	75	79	78	4	82	85	87

CHANGES IN COSTS AND MANPOWER

Costs

A/1. As will be seen from Table A.1 above, the cost of this programme under the Regular Budget is expected to increase by $506 000, of which $343 000 will be required to cover salary and other price increases and $163 000 will be a programme increase.

A/2. A programme increase of $127 000 is foreseen in connection with salaries and common staff costs owing to the addition of two Professional and two GS posts. Programme increases are also required in respect of consultants services ($5300) and temporary assistance ($20 100). Programme decreases in respect of travel ($4800) and hospitality ($200) are offset by increased requirements under common services, supplies and equipment ($5800).

A/3. With regard to the allocation of service costs, programme increases will be required for data processing services ($11 000) and printing and publishing services ($6000); these will be partly offset by a programme reduction of $7000 in respect of linguistic services.

A/4. The Agency's administrative costs in carrying out UNDP projects are in part refunded to the Agency as miscellaneous income under the Regular Budget. The UNDP programme support costs shown in Table 4 (Summary of income) are related to support both under the "Technical Assistance and Co-operation" programme and under "Executive Management and Technical Programme Planning" and "Administration".

A/5. On the basis of the indicative planning figure of $19 million suggested by the Board and endorsed by the General Conference in 1980 for voluntary contributions for 1983, an amount of $20 000 000 is tentatively foreseen for the Technical Assistance and Co-operation Fund, as compared with $16 700 000 for 1982. The increase of $3 300 000 is attributable to the expected increase in the target for voluntary contributions from $16 million to $19 million and to an expected increase of $300 000 in other income.

A/6. As can be seen from Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that UNDP will put $4 500 000 and FSSTD $150 000 at the Agency's disposal. Special contributions to finance technical assistance have also been offered by Denmark ($70 000), the Federal Republic of Germany ($400 000), Finland ($100 000), Italy ($2 851 000), Japan ($50 000), Sweden ($250 000), the United Kingdom ($250 000) and the United States of America ($1 200 000).

Manpower

A/7. Table A.2 reflects, in the "1982 Adjusted" column, the transfer of one P-4 post from this programme to the "Nuclear Fuel Cycle" programme. An explanation is provided in Annex IV.

A/8. For 1983, the addition of two Professional posts (one at the P-5 and one at the P-2 level) and two GS posts will be required. Detailed justifications for the new posts are provided in Annex IV.

A/9. For 1984, the addition of one Professional post at the P-4 level is foreseen to replace the post which in the 1982 adjusted manning table has been transferred to the "Nuclear Fuel Cycle" programme; further, two GS posts are needed, for Programme Co-ordination and the Asia and the Pacific Section. Two additional GS posts will also be required in 1985.

THE PROGRAMME

OBJECTIVE

A/10. The objective is to promote the transfer to developing countries of skills and knowledge relating to the use of nuclear energy for peaceful purposes in order to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world, in accordance with the Agency's Statute.

A/11. The mechanisms for achieving this objective are:

(a) The annual regular programme of technical co-operation approved by the Board of Governors and financed from the Technical Assistance and Co-operation Fund (the resources of which derive mainly from the voluntary contributions of Member States, a target for which is set annually by the General Conference) and through additional, extrabudgetary contributions in cash and in kind;

(b) The designation of the Agency as executing agency for UNDP-assisted projects;

(c) Special arrangements with donor countries for providing assistance to specific projects financed entirely by those countries; and

(d) Funds-in-trust arrangements with recipient countries for the provision of assistance through the Agency.

RESULTS TO DATE

A/12. Through technical co-operation projects administered by the Agency, recipient countries have been able to introduce nuclear technology, ranging from basic to advanced, in a wide variety of fields. A summary and an analysis of the results achieved are to be found in the annual reports on the provision of technical assistance by the Agency submitted to the Board and subsequently communicated to the General Conference.

A/13. The introduction of new programming techniques has solved the problem of imbalances between the types of currencies available to carry out the approved programme; all resources are now fully utilized.

A/14. The first part of a new, computer-based "management" system for the administration of technical co-operation activities started operating successfully during 1981. Closer monitoring of the programme is now possible and has led to a significant increase in the implementation rate for equipment.

A/15. A start has been made with more systematic post-project evaluation.

A/16. Programming missions to help requesting countries in the identification and preparation of long-term integrated projects have become a standard feature of the Agency's technical co-operation activities, although there are obviously limits to the fraction of the technical co-operation programme that can be accounted for by multi-year, large-scale projects as they tie up uncertain future resources. The value of the programming missions lies not only in the number of multi-year projects they generate; more important is that they help to identify key areas where external inputs are needed in various fields within the Agency's competence. With proper programming, such inputs exactly fit into a country's overall development plan even though they are being used in a large number of small, seemingly unrelated projects.

PROGRAMME TRENDS FOR 1983-84

A/17. The computer-based "management" system will be expanded to cover the fellowship and training programmes and UNDP-assisted projects.

A/18. Post-project evaluation will receive increased attention, focussing in the initial period on the methodological aspects.

A/19. As a basic nuclear infrastructure has been established in many countries, thanks to the Agency's assistance, the needs of these countries are changing; more sophisticated, and therefore more expensive, items of equipment and larger-scale activities are becoming essential for the evolution of programmes. It may often be beyond the resources of the Agency's own technical co-operation programme to meet the new needs, but the Agency is willing to assist Member States in finding additional sources of finance.

RELATED ACTIVITIES

A/20. Technical support for the Agency's technical co-operation programme is provided by units within the Department of Research and Isotopes and the Department of Nuclear Energy and Safety. On the other hand, because of their specialized knowledge of many countries and their recurring contacts with national authorities and UNDP resident representatives, the four area sections in the Division of Technical Assistance and Co-operation Programmes (Africa; Asia and the Pacific; Latin America; and the Middle East and Europe) frequently serve as intermediaries in other Agency activities - for example, the arrangement of symposia and technical panels, the negotiation of research contracts and the preparation of missions by staff members.

A/21. Much of the implementation of technical co-operation projects depends on the technical support of other Departments, staff members from which are carrying out more and more short-term technical co-operation missions. The efficient implementation of technical co-operation projects therefore depends also on adequate staffing in these Departments.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

A/22. As technical co-operation requirements will probably continue to outstrip available resources, the Agency's role as an intermediary in finding additional sources of finance may increase.

A/23. Through activities such as its training courses on the role of nuclear energy, the Agency will attempt to enhance its position as an objective source of information for governments examining the options available to meet their energy needs.

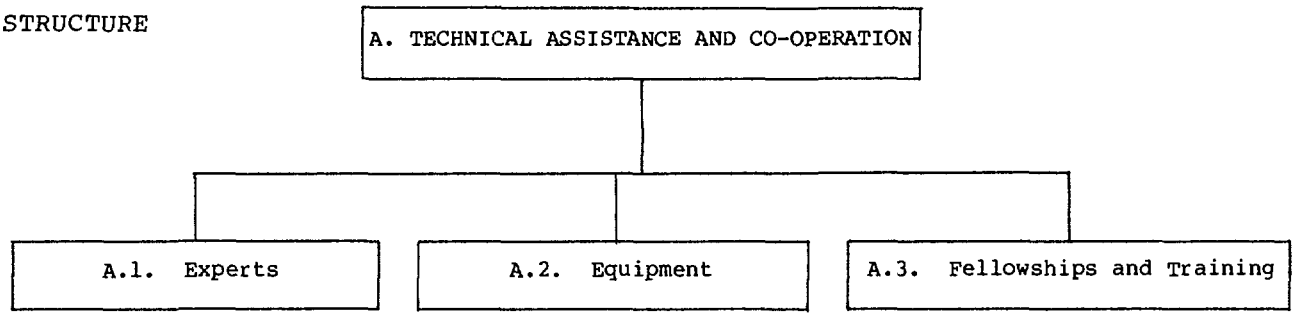
CO-OPERATION WITH OTHER ORGANIZATIONS

A/24. The Agency keeps other organizations within the United Nations system informed about its annual regular programme activities and co-operates with them whenever common interests are involved.

A/25. Special attention will be paid to co-operation with regional and intergovernmental organizations interested in activities in the nuclear field, and efforts will be made to initiate joint regional projects.

A/26. Continuous consultation with UNDP and its resident representatives will be maintained in connection with the execution of large-scale, long-term projects for the transfer of nuclear technology, nuclear raw materials prospecting, and the application of nuclear techniques.

STRUCTURE



SUB-PROGRAMME A.1

Experts

OBJECTIVE

A.1/1. The objective is to provide, through the services of internationally recruited experts, advice on and training for the implementation of technical co-operation projects.

RESULTS TO DATE

A.1/2. On average, the Agency made the services of about 350 experts available annually during the period 1978-81; altogether 77 countries benefited from these services. During the same period, over 700 expert reports were issued; most of them are available to Member States on request and are listed in the annual reports on the provision of technical assistance by the Agency.

A.1/3. In 1981, a total of 373 technical co-operation experts were in the field, several in connection with two or more projects.

PLANS FOR 1983-88

A.1/4. It is expected that the Agency's overall technical co-operation activities will continue to grow and that there will be a further increase in the number of expert assignments and associated administrative actions.

SUB-PROGRAMME A.2

Equipment

OBJECTIVE

A.2/1. The objective is to purchase and deliver equipment and supplies and obtain services required for the execution of technical co-operation projects (and also for research contracts) and to conduct negotiations and finalize arrangements for the transfer of nuclear fuels and other fissionable materials under project agreements approved by the Board of Governors.

RESULTS TO DATE

A.2/2. In support of the Agency's technical co-operation programme, equipment and supplies valued at nearly $57 million had been purchased and delivered by the end of 1981 (since 1959), with more than $9.5 million provided during 1981 itself. In addition, equipment orders valued at more than $5 million had been placed in connection with research contracts. Approximately 1600 purchase orders were processed in 1981.

PLANS FOR 1983-88

A.2/3. It is expected that the need to purchase equipment and supplies and to contract for services will expand further, in line with the growth of the Agency's technical co-operation programme and possibly with the increasingly important role played by equipment in that programme, and that the Field Procurement Section will become involved in the purchase and delivery of more sophisticated equipment, more numerous and probably more complex contractual arrangements, longer-term delivery scheduling, the negotiation of "turn key" agreements and on-site operator and maintenance worker training. It is also expected that there will be a significant increase in work connected with the transfer of nuclear fuels and other fissionable materials.

A.2/4. Suppliers will continue to be sought on a world-wide basis, efforts being made to purchase in developing as well as advanced countries.

RELATED ACTIVITIES

A.2/5. As indicated in paragraph A.2/1, the Field Procurement Section is also responsible for the purchase and delivery of equipment and supplies required for the research contract programme.

SUB-PROGRAMME A.3

Fellowships and training

OBJECTIVE

A.3/1. The objective is to provide appropriate technical and scientific training for personnel from developing countries with a view to establishing the science and technology infrastructure necessary for taking advantage of the benefits of nuclear power and ionizing radiation.

RESULTS TO DATE

A.3/2. Fellowships, scientific visits, courses and study tours are the media for training in the Agency's programme of technical co-operation. Between 1958 and the end of 1981, over 8000 fellowship and scientific visit awards had been made to trainees from more than 70 developing Member States; in addition, approximately 5500 engineers, scientists, government officials and technicians had received training through 295 courses and study tours conducted by the Agency. The situation in 1981 was as follows: 490 awards were given for fellowships and scientific visits; and the costs of 497 participants attending the 26 training courses/study tours held were borne by the Agency (a further 82 persons participated at no cost to the budget of these training projects).

A.3/3. The programme of fellowships and scientific visits has been slowly growing during the past decade; there has been a faster growth in the number of training courses and study tours, which have diversified into a wide spectrum of scientific and technical fields.

PLANS FOR 1983-88

A.3/4. It is expected that the slow but steady growth of the programme of fellowships and scientific visits will continue and that, while the Agency will still receive requests for academic training in various scientific and technical fields (which is widely available in developing as well as advanced countries), there will be growing emphasis on practical and on-the-job training (which is more directly related to development but not readily available in developing countries). In particular, the need for on-the-job training in the nuclear power field will become increasingly pressing and advanced Member States will be urged to make appropriate on-the-job training places available in greater numbers.

A.3/5. In recognition of the fact that the time and effort necessary for training technicians (including technicians for nuclear power projects) has generally been underestimated and that the need for technicians is growing, greater emphasis will also be placed on fellowships and courses for technicians, an important element of which will be practical and on-the-job training.

B. NUCLEAR POWER

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table B.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 145 785
Consultants	61 896
Temporary assistance	1 652
Sub-total	1 209 333
Common staff costs	409 312
Travel	45 310
Meetings	
Conferences, symposia, seminars	35 882
Technical committees, advisory groups	69 883
Representation and hospitality	5 495
Scientific and technical contracts	73 934
Scientific supplies and equipment	2 392
Common services, supplies and equipment	6 805
Transfer of costs:	
Translation and records services	81 901
Printing and publishing services	141 287
Data processing services	260 168
To other: PNE	(6 000)
Conference and contract services	31 382
TOTAL	2 367 084

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 290 000	91 000	-	91 000	1 381 000	1 530 000	1 624 000
81 400	6 600	14 000	20 600	102 000	149 400	153 000
5 200	300	(1 300)	(1 000)	4 200	5 000	5 000
1 376 600	97 900	12 700	110 600	1 487 200	1 684 400	1 782 000
400 000	42 100	-	42 100	442 100	490 100	519 900
49 200	5 500	(1 400)	4 100	53 300	70 900	72 000
191 000	7 000	(132 000)	(125 000)	66 000	101 000	73 000
84 000	9 000	(14 000)	(5 000)	79 000	232 000	243 000
7 200	500	-	500	7 700	8 600	9 500
90 000	6 000	24 000	30 000	120 000	140 000	155 000
-	-	-	-	-	-	-
10 000	1 000	(4 300)	(3 300)	6 700	13 000	14 600
81 000	7 000	(4 000)	3 000	84 000	90 000	96 000
411 000	36 000	(20 000)	16 000	427 000	463 000	514 000
98 000	9 000	213 000	222 000	320 000	345 000	375 000
-	-	-	-	-	-	-
68 000	6 000	(24 000)	(18 000)	50 000	75 000	82 000
2 866 000	227 000	50 000	277 000	3 143 000	3 713 000	3 936 000

SUMMARY OF MANPOWER

Table B.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	9	9	9	1	10	10	10
P-4	7	7	7	(1)	6	6	6
P-3	4	5	5	-	5	5	5
P-2	1	-	-	-	-	1	1
Sub-total	22	22	22	-	22	23	23
GS	13	12	12	-	12	12	12
TOTAL	35	34	34	-	34	35	35

CHANGES IN COSTS AND MANPOWER

Costs

B/1. As will be seen from Table B.1 above, the cost of this programme is expected to increase by $277 000, of which $227 000 will be required to cover salary and other price increases and $50 000 will be a programme increase.

B/2. Programme increases are foreseen in respect of consultants' services ($14 000) for the "Power reactors of proven types - nuclear power programmes and technology" sub-programme, and in respect of scientific and technical contracts for the "Energy forecasts and the economic assessment of nuclear power and its fuel cycle" sub-programme ($24 000).

B/3. Programme decreases are foreseen for temporary assistance ($1300), travel ($1400) and common services, supplies and equipment ($4300). The programme decrease of $132 000 in respect of conferences, symposia and seminars compared with 1982 is due to the fact that the budget for the latter year included the International Conference on Nuclear Power Experience. Although the number of Technical Committees and Advisory Groups planned for 1983 is one more than in the 1982 budget, a programme decrease of $14 000 is foreseen, owing to decreased use of interpretation and a smaller number of paid experts.

B/4. As regards the allocation of service costs, the following programme decreases are foreseen: $4000 in respect of linguistic services, $20 000 in respect of printing and publishing services and $24 000 in respect of conference and contracts services (related to the overall decrease in the number of meetings requiring these services). A programme increase of $213 000 will be required for data processing services. This increase, as already reflected in the 1981 actual requirements, is mainly connected with the energy and economic data bank, the power reactor information system and energy demand and supply models.

Manpower

B/5. As will be seen from Table B.2 above, the upgrading of one Professional post from the P-4 to the P-5 level is foreseen in the "Power reactors of proven types - nuclear power programmes and technology" sub-programme. Detailed justification is provided in Annex IV.

B/6. For 1984, the addition of one P-2 post for an economic analyst is foreseen. No further change is expected for 1985.

THE PROGRAMME

OBJECTIVE

B/7. The objective is to promote the exchange of information between Member States on technical aspects of the reliability and safety of nuclear power plants and economic aspects of nuclear power and its fuel cycle, to provide assistance to Member States in the planning, implementation and operation of nuclear power plants, and to assist in the development and timely introduction of technologies and fuel cycle concepts for advanced nuclear power systems. This will be done in particular by:

(a) Assessing and evaluating the future energy supply role and economic status of nuclear power compared to other energy sources, especially for developing countries;

(b) Assisting developing Member States in the formulation, implementation and execution of nuclear power programmes (including advice and assistance with the creation of the necessary infrastructure);

(c) Analysing nuclear power plant performance, operating experience and system reliability;

(d) Organizing the exchange and dissemination of information on developments in technologies and quality assurance of direct importance to nuclear power plant safety, reliability and economic performance; and

(e) Organizing the exchange of information on the present status, future potential, economic and safety characteristics and criteria of advanced nuclear power reactors and associated fuel cycles.

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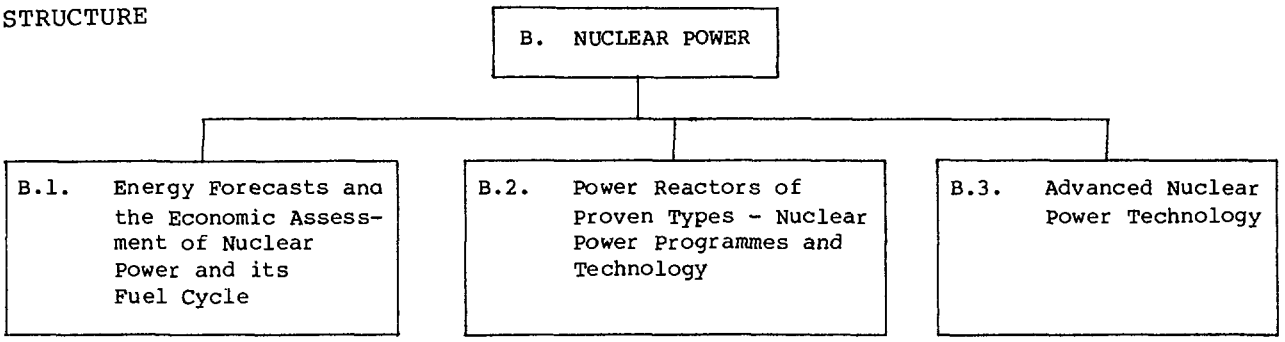


B.1.1. Energy demand analysis

B.1.2. Economics of nuclear power and its fuel cycle

B.1.3. Planning of nuclear power programmes in developing countries

B.1.4. Demand for nuclear raw materials and fuel cycle services

B.2.1. Survey of nuclear power programmes in developing countries

B.2.2. Manpower development

B.2.3. Assistance in development of national infrastructures and related activities

B.2.4. Potential low-temperature heat applications of nuclear power

B.2.5. Survey of nuclear power plant operating experience

B.2.6. Nuclear power plant systems performance

B.2.7. Quality assurance for nuclear power plants

B.3.1. Power reactor technology

B.3.2. Reactor and fuel cycle concepts

B.3.3. In-core fuel management

Summary of manpower and costs by sub-programme

Table B.3

Sub-programme	1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Energy forecasts and the economic assessment of nuclear power and its fuel cycle	7.4	3.8	1 011 000	8.4	3.8	1 154 000	8.4	3.8	1 248 000
Power reactors of proven types - nuclear power programmes and technology	10.4	5.8	1 607 000	10.4	5.8	1 790 000	10.4	5.8	1 825 000
Advanced nuclear power technology	4.2	2.4	525 000	4.2	2.4	769 000	4.2	2.4	863 000
TOTAL	22.0	12.0	3 143 000	23.0	12.0	3 713 000	23.0	12.0	3 936 000

SUB-PROGRAMME B.1

Energy forecasts and the economic assessment of nuclear power and its fuel cycle

OBJECTIVE

B.1/1. The objective is to assess and evaluate the future economic status and energy supply role of nuclear power compared to other energy sources (with special attention to the situation in developing countries) and the resulting demands for nuclear power plants, nuclear fuel and fuel cycle services.

PROGRAMME TRENDS FOR 1983-84

B.1/2. The future role of nuclear power can be analysed realistically only within the general framework of future energy needs as influenced by social, economic and technological development. As a result, all future-oriented studies related to nuclear power in general and its economic aspects in particular require large amounts of data and sophisticated analytical tools. The Agency is being increasingly requested to supply the relevant data. Furthermore, Member States, and especially the developing countries, are interested in advanced methods for energy and nuclear power system planning, and are concerned to have their experts trained in these fields.

B.1/3. The programme for 1983-84 gives increased emphasis to general energy (including nuclear) planning tools as well as to the need for reliable information on the total cost of nuclear power programmes vis-a-vis other energy sources and statistical data on the evolution of energy consumption and the economic development of individual countries and regions of the world. This involves maintaining and updating the Energy and Economic Data Bank (EEDB), carrying out economic studies, developing energy planning methods specially oriented to the needs of developing countries and transferring these methods to developing Member States. These tools and data are essential if the Agency is to be prepared to carry out case studies of energy supply and demand at the request of Member States.

Energy forecasts and the economic assessment of nuclear power and its fuel cycle

Summary by programme components

Table B.4

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Energy demand analysis	3.7	1.5	287 800	3 000	20 000	6 200	317 000
Economics of nuclear power and its fuel cycle	2.7	1.5	226 100	8 000	38 000	2 900	275 000
Planning of nuclear power programmes in developing countries	0.7	0.4	59 300	5 000	-	700	65 000
Demand for nuclear raw materials and fuel cycle services	0.3	0.4	27 700	-	-	7 300	35 000
Linguistic services	-	-	-	-	-	14 000	14 000
Printing and publishing services	-	-	-	-	-	46 000	46 000
Data processing services	-	-	-	-	-	250 000	250 000
Conference and contracts services	-	-	-	-	-	9 000	9 000
TOTAL	7.4	3.8	600 900	16 000	58 000	336 100	1 011 000

Energy demand analysis (component B.1.1)

Objective

B.1.1/1. The objectives are: to provide, in a unified and systematic way, energy and related economic data for long-term energy demand analysis and supply planning; and to ascertain the role which could be played by nuclear power in supplying the energy needs of the world in general and the developing regions in particular.

Results to date

B.1.1/2. The Energy and Economic Data Bank (EEDB) reached operational status at the end of 1981. Energy and economic data required for analysis of the role of nuclear power in Member States, for official Agency reports and studies, or for national, regional or world surveys can now be obtained quickly through computerized procedures.

B.1.1/3. A preliminary version of MAED (Model for Analysis of Energy Demand) has been developed for analysing the energy demands in developing countries, and was first used in 1981 for the analysis of the energy and electricity demand in Algeria. The future electric load curves produced by MAED served as input in the subsequent WASP study (see also B.1.3/3).

B.1.1/4. The Agency's methodologies for projecting energy, electricity and nuclear power demands at regional and global levels were reviewed in 1981 and recommendations for improved methodologies were made (see also B.1.1/8).

B.1.1/5. A training manual "National Energy Plans in Developing Countries: Role of Nuclear Energy" was prepared in 1981 for publication in 1982.

Plans for 1983-84

B.1.1/6. The annual updating of the EEDB and development of new retrieval programs will continue, and the EEDB will be used as the basis for Agency reports on energy resources and utilization, national economic parameters and various statistical trends. It will also be used in analyses of the energy supply role of nuclear power in Member States, and in national, regional or world surveys (Table B.8, Nos 1 and 2).

B.1.1/7. Development work will continue on improved methodologies for analysing energy, electricity and nuclear power demands at the national level, including the effects on nuclear power demand caused by possible changes in the structure of electricity demand or an increased nuclear role in the supply of low-temperature process heat. The MAED methodology will be completed and made available to Member States (Table B.8, No.3). Work will be carried out through a contract with the Institut fuer Elektrische Anlagen und Energiewirtschaft der Technischen Hochschule Aachen (TH Aachen) to develop a second general methodology for estimating future demands for energy and electricity in individual developing countries. The resulting new model will be put to use during 1983, following a period of testing and comparison with the MAED methodology.

B.1.1/8. The Agency's methodologies for projecting energy, electricity and nuclear power demands at the global level will be improved through research work being carried out in co-operation with IIASA, the Institute for Energy of the Technical University of Vienna, and eventually perhaps the United Nations Department of Technical Co-operation for Development (UN-DTCD). The main objective of this research is to develop and implement a simplified set of computer models based on the experience and results of the IIASA Energy Systems Program. A prototype methodology resulting from the first phase of this work will be reviewed in 1983 and an improved methodology will be completed during 1984 (Table B.8, No.4).

Related activities

B.1.1/9. Energy systems planning assistance to Member States (see also component B.1.3) will be provided through technical co-operation projects upon request. For this purpose, the full capabilities of the EEDB and MAED methodologies, as well as the new methodologies under development, will be utilized. Interregional training courses in energy system planning will be offered to Member States. Courses were held in Spain in 1981 and in Indonesia in 1982.

New developments foreseen for 1985-88

B.1.1/10. Work on the EEDB will be concerned mainly with improving data quality and facilitating the use by Member States of the data and methodologies supplied by the Agency.

Co-operation with other organizations

B.1.1/11. This component involves co-operation with IIASA, UN-DTCD and NEA.

Economics of nuclear power and its fuel cycle (component B.1.2)

Objective

B.1.2/1. The objective is to monitor continuously the basic cost parameters determining the competitiveness of nuclear power plants in relation to conventional power plants and renewable energy sources and to examine the broadest economic implications of introducing nuclear power into national energy systems.

Results to date

B.1.2/2. Past experience with capital investment costs of nuclear and fossil-fired power plants has been studied in detail. A draft review and comparison of capital investment costs for nuclear and coal-fired power plants in the United States was prepared in 1981 for publication in 1982.

B.1.2/3. A guidebook on technical evaluation of bids for nuclear power plants was published in 1981.

B.1.2/4. Computer programs for calculating the investment costs of light-water and heavy-water nuclear plants and fossil-fuel-fired plants have been adapted with the assistance of consulting engineering firms and used to provide data for the economic analysis of nuclear power programmes in developing countries.

Plans for 1983-84

B.1.2/5. Under a CRP initiated in 1982, research will be carried out into the broadest economic implications of introducing nuclear power into national

energy systems. Topics to be examined are: nuclear power programmes in the context of the overall economic development of individual developing countries, and in particular the pre-requisites for effective nuclear power introduction (see also B.2.3/3); investment and financing for energy programmes within overall industrial investment requirements; effects on balance of payments; stimulation of other economic sectors; growth in gross domestic product; the specific role of electricity as a function of the urban/rural population distribution (see also B.2.1/3); and shifts from non-commercial to commercial energy supplies. A comparison of the basic economic parameters of nuclear power and other energy supply schemes will be made (Table B.8, No.5).

B.1.2/6. The capital investment costs of electric power plants (both nuclear and conventional) will continue to be studied, partly within the above CRP, and reports providing updated in-depth analyses of capital cost experience and cost trends with time will be prepared (Table B.8, No.6). The investment requirements for small and medium-size power reactors will be studied (Table B.8, No.7) in conjunction with the survey of nuclear power programmes in developing countries (component B.2.1).

B.1.2/7. The costs of nuclear raw materials and nuclear fuel cycle services will continue to be reviewed with the aim of developing cost projections to serve as input to the analysis of the overall economics of nuclear power (Table B.8, No.8).

B.1.2/8. The guidebook on the economic evaluation of bids for electric power plants published in 1976 will be revised (Table B.8, No.9). The new edition will cover engineering economics, different methods of treating cost escalation and inflation during the construction and operation of a plant, conversion between different currencies and evaluation of the net costs or benefits arising from alternative financing plans.

B.1.2/9. In order to provide a complete picture of the alternatives to nuclear energy, the technical and economic status of new power generation and energy storage technologies will be reviewed (Table B.8, No.10).

Related activities

B.1.2/10. Economic and financial analysis assistance to Member States will be provided through technical co-operation projects upon request. For this purpose, the data and methodologies developed by the Agency will be made available to Member States (see also components B.1.3 and B.2.1).

Co-operation with other organizations

B.1.2/11. This component involves co-operation with the World Bank, WEC and various national agencies.

Planning of nuclear power programmes in developing countries (component B.1.3)

Objective

B.1.3/1. The objective is to assist Member States, upon request, in the planning of their nuclear power programmes.

Results to date

B.1.3/2. In response to requests, the Agency has in the past made available its WASP methodology to Member States and has provided training to 139 engineers from 43 countries in its use. The WASP-III version was completed in 1981 and the corresponding Users' Manual and supporting documentation was issued. They have already been distributed on request to 40 Member States.

B.1.3/3. In 1981, electric system expansion planning for Algeria was carried out at the request of that Government and a report on the role of nuclear power in the national energy plan produced (see also B.1.1/3).

B.1.3/4. On request, an electric system expansion planning study for Morocco was carried out in 1981 and a report submitted to the Government.

Plans for 1983-84

B.1.3/5. A guidebook on electrical generation system expansion planning, started during 1981 with the assistance of the Argonne National Laboratory (United States), will be issued in 1983 (Table B.8, No.11). This guidebook will include the WASP model and the energy data used as input.

B.1.3/6. The WASP methodology will be developed further into the WASP-IV version; this will cover financial constraints, the treatment of multi-node systems and hydroelectric plants with large reservoirs, and models of new electrical energy storage techniques (Table B.8, No.12).

Related activities

B.1.3/7. In conjunction with the survey of the nuclear power programmes in developing countries (component B.2.1), the economic and financial information obtained in the activities described in component B.1.2 will be used to assist Member States upon request in electrical generation system expansion planning. For this purpose, the full capabilities of the EEDB, MAED and WASP methodologies will be utilized. Training in the use of WASP will be offered through interregional training courses. In 1981, a course was held in the United States.

Co-operation with other organizations

B.1.3/8. The WASP methodology developed in this component is used by a number of organizations, including the World Bank, the Inter-American Development Bank, the Economic Commission for Latin America, the Economic and Social Commission for Asia and Pacific, and the Regional Electrical Integration Commission in South America.

Demand for nuclear raw materials and fuel cycle services (component B.1.4)

Objective

B.1.4/1. The objective is to assess the nuclear fuel resource requirements and fuel cycle service needs associated with projected nuclear power deployment programmes and alternative fuel cycle options.

Results to date

B.1.4/2. Work carried out in 1978-79 produced a computer model (SCENARIOS) of material flows and service requirements at each stage of the nuclear fuel cycle. It was used during the INFCE study in the analysis of nuclear power programmes and alternative fuel cycle strategies.

Plans for 1983-84

B.1.4/3. Future requirements for nuclear fuel and fuel cycle services will continue to be estimated in order to provide global demand information to Member States concerned with ensuring supplies for their nuclear programmes or markets for their resources.

Related activities

B.1.4/4. Results from this activity will be used, as appropriate, to support the work of CAS and the Agency's co-operative work with NEA.

Co-operation with other organizations

B.1.4/5. This component involves co-operation with NEA.

SUB-PROGRAMME B.2

Power reactors of proven types - nuclear power programmes and technology

OBJECTIVE

B.2/1. The objective is to assist Member States, in particular those which are developing countries, with objective information on infrastructure requirements for nuclear power programmes and nuclear power planning and with advice on programme formulation and project execution; to assess future applications of proven reactors, including the supply of low-temperature heat; to provide Member States with current and authoritative information on the technological status of and operating experience with nuclear power plants of proven types, to assist in the use of this information for planning purposes and to make recommendations on how to achieve required levels of quality assurance, satisfactory performance and safety.

PROGRAMME TRENDS FOR 1983-84

B.2/2. Since 1976, only two developing countries have taken the decision to order a first nuclear power plant, although such a decision is under active consideration in some four or five countries and existing nuclear power programmes have been expanded in four countries since 1980-81. Problems of financing and the decreasing rate of economic development are the major reasons for this situation, but difficulties associated with electricity supply grids, manpower availability, industrial support, organizational structures and plant operation and regulation also continue to be major problem areas both in countries with existing nuclear power programmes and in those contemplating the introduction of such programmes. Accordingly, a major element in the Agency's activities in this field is to provide authoritative information on infrastructure requirements. This is being done through the preparation of a series of guidebooks, which should be nearly completed by the end of 1984, and also through the provision of advisory services in response to requests. Such requests have in some cases already resulted in major UNDP projects.

B.2/3. The Agency's collection of operating experience data, which provides an important world-wide review of information on plant reliability and is being used more and more by plant operators, will reflect the rapidly increasing experience of nuclear power operation. On the basis of this data collection, it will be possible to determine specific subject areas where additional information exchange or co-ordinated research and development activities would be beneficial for promoting nuclear power plant reliability and safety. Quality assurance will continue to be a priority area.

Power reactors of proven types - nuclear power programmes and technology

Summary by programme components

Table B.5

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Survey of nuclear power programmes in developing countries	1.0	0.8	108 900	6 000	-	5 100	120 000
Manpower development	2.1	1.0	198 100	15 000	-	2 900	216 000
Assistance in development of national infrastructures and related activities	2.1	1.0	199 300	-	-	5 700	205 000
Potential low-temperature heat applications of nuclear power	1.1	0.5	98 600	12 000	-	2 400	113 000
Survey of nuclear power plant operating experience	1.1	1.0	112 200	-	5 000	9 800	127 000
Nuclear power plant systems performance	2.0	1.0	195 600	34 000	25 000	4 400	259 000
Quality assurance for nuclear power plants	1.0	0.5	92 600	42 000	-	6 400	141 000
Linguistic services	-	-	-	-	-	42 000	42 000
Printing and publishing services	-	-	-	-	-	312 000	312 000
Data processing services	-	-	-	-	-	44 000	44 000
Conference and contracts services	-	-	-	-	-	28 000	28 000
TOTAL	10.4	5.8	1 005 300	109 000	30 000	462 700	1 607 000

Survey of nuclear power programmes in developing countries (component B.2.1)

Objective

B.2.1/1. The objective is to collect and evaluate information on nuclear power programmes, national infrastructure problems and technology transfer requirements, so as to define the areas in which advice and assistance from the Agency can be most effectively provided.

Results to date

B.2.1/2. The study of the special needs of the developing countries made in 1978 for INFCE has served as a basis for defining infrastructure requirements for nuclear power programmes. Reviews of the availability and suitability of reactors in the 200-450 MW(e) range were published in conference proceedings in 1980 and 1981. Studies of the integration of large plants into small and weak grids were published in 1982 in the guidebook on "Nuclear Power Plant-Grid Interaction". A guidebook on "Introduction of Nuclear Power" was produced in 1982 as an updating and expansion of "Steps to Nuclear Power" (1975).

Plans for 1983-84

B.2.1/3. In co-ordination with sub-programme B.1, the problems of supplying energy to large urban areas will be studied (Table B.8, No.13).

B.2.1/4. The basic studies in 1980-81 which led to the guidebook on plant-grid interactions will be applied in a small number of case studies in order to define criteria for the introduction of nuclear plants. A review will be made of grid rigidity requirements (Table B.8, No.14).

B.2.1/5. Smaller nuclear power plants in the 200-450 MW(e) range with new designs, based to a large extent on proven systems, are now available but the economics of such plants remain uncertain. The Agency will be prepared to assist interested countries upon request with bid specifications and bid evaluation. Possible financing mechanisms and organizational arrangements (for construction and operation) which would minimize the demand on national infrastructures will be investigated.

Related activities

B.2.1/6. Six technical co-operation projects on nuclear power planning were being supported in 1981. This number is likely to increase in the future.

B.2.1/7. Advisory missions were sent in response to requests from three Member States in 1980-82.

New developments foreseen for 1985-88

B.2.1/8. Efforts will be devoted to more specific studies of small and medium-power reactors and to case studies for their introduction.

Co-operation with other organizations

B.2.1/9. Co-operation will be maintained with the World Bank and UNCNRET.

Manpower development (component B.2.2)

Objective

B.2.2/1. The objective is to provide general advice on nuclear manpower development, to help Member States in evaluating their manpower needs and to provide them with comprehensive assistance in their manpower development programmes.

Results to date

B.2.2/2. The "Guidebook on Manpower Development for Nuclear Power", published in 1980, has provided general advice to Member States and served as a basis for all related advisory services and technical co-operation projects.

Plans for 1983-84

B.2.2/3. International guidelines for the qualification and training requirements for power plant operations staff will be published (Table B.8, No.15). A seminar on nuclear power plant operations management will be held in 1984 (Annex II(1)).

B.2.2/4. To assist Member States in establishing nuclear engineering education courses, a guide on university curricula will be published in 1985 (Table B.8, No.16).

B.2.2/5. The problems caused by the decreasing numbers of new university graduates available for and choosing to work in the nuclear power programmes will be studied (Table B.8, No.17).

Related activities

B.2.2/6. Technical support is now given to five co-operation projects under the regular programme and to two major UNDP projects. Staff have also participated in several special missions to define UNDP projects and in advisory services to two Member States. This is likely to continue at a rate of about three missions per year.

B.2.2/7. The nuclear power training programme was initiated in 1975. By the end of 1981, more than 1000 professionals from more than 50 developing countries had attended courses. As the need for interregional courses decreases and there is a shift towards more specialized training, greater consideration will be given to schemes for helping to establish adequate training facilities in developing countries.

Co-operation with other organizations

B.2.2/8. The work on qualification guidelines is carried out in co-ordination with NEA. It is expected that closer contacts with the United Nations, UNESCO and UNIDO will be established for the future manpower development programme.

Assistance in development of national infrastructures and related activities (component B.2.3)

Objective

B.2.3/1. The objective is to assist developing countries with information about the organizational, industrial and research activities needed to support a nuclear power programme, and to advise on the execution of nuclear power programmes and projects with particular attention to the advance planning of related infrastructure development.

Results to date

B.2.3/2. Five guidebooks were published between 1978 and 1982.

Plans for 1983-84

B.2.3/3. The necessary infrastructure requirements in organization, industry, and research and development institutions for effective nuclear technology transfer will be reviewed (Table B.8, No.18) and guidance will be developed on the evaluation of existing and planned industrial support in developing countries (Table B.8, No.19).

B.2.3/4. A symposium on experience of nuclear power plant outages will be held in 1984 in conjunction with component B.2.5 (Annex II(2) and Table B.8, No.20).

Related activities

B.2.3/5. In 1981, advice was given on the planning and execution of ten technical co-operation projects; this number is likely to increase in future years. Advisory services have also been provided.

New developments foreseen for 1985-88

B.2.3/6. Increasing efforts will be directed towards preparing plant owners in developing countries for major repair and maintenance operations through improved information dissemination.

Potential low-temperature heat applications of nuclear power (component B.2.4)

Objective

B.2.4/1. The objective is to study the contribution which nuclear power could make to the supply of low-temperature heat in the 1990s.

Results to date

B.2.4/2. A report on urban district heating using nuclear heat was produced in 1977.

Plans for 1983-84

B.2.4/3. A survey of potential low-temperature heat applications of nuclear power will be made (Table B.8, No.21) in the light of studies being carried out and plans being made in a number of countries.

Survey of nuclear power plant operating experience (component B.2.5)

Objective

B.2.5/1. The objective is to collect, evaluate and publish annually data on nuclear power plant performance, including safety aspects, to make these data available to plant operators for specific analyses, and to assist in improving the feedback of operating experience.

Results to date

B.2.5/2. The report "Operating Experience with Nuclear Power Plants in Member States" has been issued annually since 1970, supplemented by the "Performance Analysis Report" since 1975. The formats have been modified several times to respond to the changing needs of plant operators. A computer-produced listing of power reactors has been published annually, since 1981 in a simplified reference format.

B.2.5/3. The data so far collected have been merged into a single data base, which now includes information on some 12 000 full plant outages up to 1980 and is being used for analytical studies.

Plans for 1983-84

B.2.5/4. The annual reports will to a large extent be produced directly from the computerized data base. Plant operators will thus be able to request more specific analyses and obtain information which is more directly applicable to an individual plant. The information will also be made available on-line to Member States for specific studies. The format of the reports will again be reviewed (Table B.8, Nos 22-24). Support will be given to the "Nuclear Safety" programme in the collection and evaluation of information on abnormal occurrences of safety significance.

Related activities

B.2.5/5. The Agency also provides the nuclear power plant performance data used by WEC and UNIPEDE in their reports.

Co-operation with other organizations

B.2.5/6. The CEC provides the performance data for power plants within its Member States. Evaluation of the operating information is carried out in close co-operation with CEC, UNIPEDE and WEC.

Nuclear power plant systems performance (component B.2.6)

Objective

B.2.6/1. The objective is to collect, evaluate and disseminate information on the principles, methods and techniques used to achieve reliability and safety in reactor systems.

Results to date

B.2.6/2. The International Working Groups on Reliability of Reactor Pressure Components (IWG-RRPC) and on Nuclear Power Plant Control and Instrumentation (IWG-NPPCI) were established in 1967 and 1970 respectively and have provided an important information exchange in the two subject areas. A CRP on irradiation embrittlement of pressure vessel steels has given results of international significance (Table B.7, No.1). A guidebook on nuclear power plant control and instrumentation was published in 1982.

Plans for 1983-84

B.2.6/3. The above two IWGs will continue (Table B.8, No.25). Subjects to be considered at IWG-RRPC specialists' meetings will include: defect detection and sizing; flaw initiation and propagation mechanisms; radiation embrittlement surveillance; and the reliability of in-service inspection techniques (Table B.8, Nos 26-29). A symposium on the reliability of reactor pressure components will be held in 1983 (Annex I(1) and Table B.8, No.30). The CRP on radiation embrittlement of advanced pressure vessel steels (Table B.7, No.1) will be concluded in 1983 (Table B.8, No.31) and will be followed by programmes on optimization of methods for ensuring the integrity of reactor pressure vessels under neutron irradiation and on non-destructive testing techniques in in-service inspection. Within the IWG-NPPCI, the priority subject will be the man-machine interface in nuclear power plant control. Specialists' meetings are planned on: alarm and disturbance analysis instrumentation; the use of computers in safety systems; the use of simulators for training, development and demonstration work; and human factors engineering in control systems design (Table B.8, Nos 32-35). Close co-operation and co-ordination will be maintained with the "Nuclear Safety" programme.

Related activities

B.2.6/4. In 1981, eight projects were given technical support and some 20-30 fellowships evaluated.

Co-operation with other organizations

B.2.6/5. Activities will be closely co-ordinated with the standardization work of ISO and IEC and with the information exchange and research co-ordination within NEA and CEC.

Quality assurance for nuclear power plants (component B.2.7)

Objective

B.2.7/1. The objective is to complete work on the quality assurance guides within the framework of the NUSS programme and thereafter to give advice to Member States in general through operator-oriented engineering guides on quality assurance and specifically through advisory services upon request to individual countries.

Results to date

B.2.7/2. The international code of practice on quality assurance (QA) was issued in 1978 and ten of the eleven planned QA safety guides have been completed. A symposium on QA for nuclear power plants was held in 1981. A programme to establish local QA training in the Republic of Korea has been completed. With the completion of the work for the NUSS programme, the effort has been re-oriented towards the development and production of practical manuals on how the NUSS quality assurance code and guides can be implemented in practice. The first manual on auditing of quality assurance programmes has been prepared for issue in 1982.

Plans for 1983-84

B.2.7/3. Techniques for the selection of QA programme levels will be evaluated (Table B.8, No.36) and the qualification and certification of QA personnel will be reviewed (Table B.8, No.37). A training seminar for the Latin American region will be held in 1983 (Annex I(2) and Table B.8, No.38).

B.2.7/4. The problem of evaluating the effectiveness of QA, i.e. trying to determine the relationship between it and the reliability of nuclear power plants, will be reviewed (Table B.8, No.39).

Related activities

B.2.7/5. In 1981 three technical co-operation projects were serviced: a staff member served in a short-term expert assignment and participated in two missions to assist with the application of NUSS QA standards at the national level. Requests for this kind of assistance are expected to increase.

Co-operation with other organizations

B.2.7/6. Quality assurance guides have been co-ordinated with the standards work of ISO.

SUB-PROGRAMME B.3

Advanced nuclear power technology

OBJECTIVE

B.3/1. The objective is to evaluate the potential of advanced nuclear power reactor systems for expanding the future energy supply, by means of technical information exchange on development programmes and by assessment of the problems and future prospects for utilization by Member States.

PROGRAMME TRENDS FOR 1983-84

B.3/2. The long-term ability of nuclear power to provide a major share of the world's energy has been recognized in a number of studies (including INFCE) to depend upon the use of low-cost nuclear fuel created by conversion

in advanced nuclear power reactors from naturally occurring fertile materials. The successful contribution of nuclear energy will depend on the timely introduction of advanced nuclear power technologies such as fast breeders (the most commonly recognized long-term independent nuclear energy supply source), advanced converter reactors (which can multiply the energy obtainable from low-cost uranium reserves), high-temperature reactors (which can produce both electricity and high-temperature process heat and therefore greatly extend the period of availability of fossil fuel resources), and fusion power reactors (which can use new nuclear fuel resources).

B.3/3. The long operating life of a nuclear power station means that a new plant now under early consideration would actually operate mainly during the first half of the next century, by which time costs associated with all currently used energy sources are expected to have risen. If nuclear power is to have a major impact on the world energy shortage, and if known low-cost sources of uranium-235 are not greatly augmented, advanced reactor systems that utilize the much greater available resources of fertile nuclear material will be needed. Several such reactor types are already near industrial-scale use and in principle could be deployed early in this time period if certain conditions are met - including economically competitive plant and fuel cycle costs, closing of the necessary fuel cycles, the existence of supporting infrastructures and commercial availability.

B.3/4. The programme for 1983-84 will continue to emphasize the exchange of information on development progress and operating experience. Activities will include the collection, analysis and dissemination of information about the current status of advanced reactors, promotion of work on the evaluation of the role of advanced reactors in the world's energy supply, and the encouragement of international co-operation in development and assessment of their future prospects.

B.3/5. The current work aimed at providing assistance to developing countries on the operational reactor physics of nuclear power plants will be continued.

Advanced nuclear power technology

Summary by programme components

Table B.6

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Power reactor technology	1.8	0.9	136 500	13 200	-	6 300	156 000
Reactor and fuel cycle concepts	1.8	0.9	134 800	6 800	-	7 400	149 000
In-core fuel management	0.6	0.6	51 800	-	32 000	200	84 000
Linguistic services	-	-	-	-	-	28 000	28 000
Printing and publishing services	-	-	-	-	-	69 000	69 000
Data processing services	-	-	-	-	-	26 000	26 000
Conference and contracts services	-	-	-	-	-	13 000	13 000
TOTAL	4.2	2.4	323 100	20 000	32 000	149 900	525 000

Power reactor technology (component B.3.1)

Objective

B.3.1/1. The objective is to review and assess the status of major advanced reactor programmes that are nearing commercialization and to promote development through an exchange of information on technical issues important to the safe and economic utilization of advanced reactor systems.

Results to date

B.3.1/2. Questions related to the safe, reliable and economic operation of fast breeder reactor (FBR) systems are reviewed by the International Working Group on Fast Reactors (IWGFR), which was established in 1968 and has assisted in organizing a number of symposia and specialists' meetings. Topics considered in 1981-82 relevant to the operational safety of fast reactors include: fuel failure detection and location in LMFBRs; design features affecting the dynamic behaviour of fast reactor cores; boiling noise detection in sodium; the design and testing of equipment for detection and prevention of sodium fires; and advances in structural analysis for LMFBR applications. A report on the development status of FBRs has been prepared for publication in 1982; it includes an up-to-date summary of the plant parameters of the major experimental, demonstration and commercial LMFBRs already operating, under construction or planned in Member States.

B.3.1/3. In order to assist the Agency in investigating the development and future prospects for high-temperature gas-cooled reactors for electricity production and nuclear process heat applications, the International Working Group on Gas-Cooled Reactors (IWGGCR) was established in 1978. Specialists meeting in this group have considered topics related to safety and also the technology associated with the applications of process heat. A report summarizing the development status and potential applications of HTR technology has been prepared for publication in 1982.

Plans for 1983-84

B.3.1/4. Considerable amounts of new data are accumulating on large experimental and demonstration LMFBRs, and these will be reviewed at a symposium on fast breeder reactor experience and future trends to be held in 1984 (Annex II(3) and Table B.8, No.40). The information exchange activities will be continued in specialists' meetings on subjects to be determined by the IWGFR (Table B.8, Nos 41 and 42). There will be increased emphasis on the safety and economic aspects. Data obtained on plant and fuel cycle economics will be used in assessment studies of nuclear power and its future prospects in co-operation with sub-programme B.1. The interrelation between reactor and plant design and the application of safeguards will be reviewed in co-operation with the "Safeguards" programme. A CRP related to LMFBR safety, with emphasis on the initial stages of accidents, their prevention and detection, will be initiated in 1983.

B.3.1/5. National programmes on process heat applications - including coal gasification, steel-making, long-distance energy transport and ammonia production - will be reviewed in 1983 and 1984 (Table B.8, No.21), and specialists' meetings will discuss economic aspects and the development of high-temperature process heat technology (Table B.8, Nos 43 and 44). In view of the importance of high-temperature corrosion-resistant materials for heat exchangers for coal gasification and steel-making applications and the need to make the best use of available test facilities and international experience, a CRP on the selection and qualification of materials for reactor components operating at very high temperatures will be started in 1983.

New developments foreseen for 1985-88

B.3.1/6. With the accumulation of operating experience on large advanced reactors and the approach to commercialization, the need for the development of international safety design criteria will be reviewed in 1985.

Reactor and fuel cycle concepts (component B.3.2)

Objective

B.3.2/1. The objective is to evaluate the potential contribution of advanced nuclear power reactors to the increase of usable energy resources; this will be done by a technical information exchange on development programmes, analysis of resource utilization implications, and assessment of factors crucial to prospects for deployment such as safety, economics, the fuel cycle and infrastructure development.

Results to date

B.3.2/2. Progress in fusion reactor design concepts has been reviewed in detail at about four-year intervals, most recently in 1982 in a report which identifies priority areas for near-term research and development in key technologies and made recommendations for international co-operation.

B.3.2/3. The development status of several alternative gas-cooled reactor concepts based on substantial development programmes was reviewed in 1981. The constraints on reactor design and the potential benefits from the use of nuclear process heat to replace fossil fuel were reviewed in 1982.

B.3.2/4. An evaluation of the potential contribution of advanced nuclear power reactors to the world energy supply was started in 1982 in co-operation with related Agency programmes.

Plans for 1983-84

B.3.2/5. A report on the use of nuclear process heat to replace fossil fuel will be completed (Table B.8, No.45).

B.3.2/6. The potential contribution of advanced reactors to the world energy supply will be evaluated and a report published in 1985 (Table B.8, No.46). This will deal with four major areas: (1) the need for breeders in order to make full use of plentiful uranium-238 and thorium reserves and to supply fissile fuel to support the operation of existing thermal reactors; (2) the use of advanced converter reactors; (3) applications of high-temperature nuclear process heat; and (4) the use of controlled thermonuclear reactors employing lithium as a fertile material.

B.3.2/7. The current development status of fusion reactor materials for first-wall and blanket regions will be reviewed and further development needs will be assessed (Table B.8, No.47). The adequacy of methods for interpreting experimental results on the accelerator simulation of irradiation effects in a fusion environment will be assessed (Table B.8, No.48). A CRP dealing with fusion reactor materials will be started in 1983.

In-core fuel management (component B.3.3)

Objective

B.3.3/1. The objective is to foster the dissemination of information and calculation methods for in-core fuel management analysis in commercially available nuclear power reactors, with the special aim of assisting developing countries.

Results to date

B.3.3/2. During 1982, a four-week course in reactor physics aspects of safety analysis for nuclear scientists and engineers in developing countries is being organized at Trieste.

B.3.3/3. Work began in 1981 on a CRP for compiling a complete set of computer programs suitable for use at universities and institutes in developing countries for analysing the in-core fuel management of commercially available reactor types (Table B.7, No.2).

Plans for 1983-84

B.3.3/4. The proceedings of the Trieste course will be published for use by university lecturers (Table B.8, No.49).

B.3.3/5. The CRP (Table B.7, No.2) on computer codes for in-core fuel management of power reactors will continue, with the aim of preparing integrated core packages on magnetic tapes suitable for use with the basic computer types available in developing countries. The appropriate documentation will be prepared for use both in preliminary studies at universities or reactor institutes and at an advanced level (analysis of specific reactor operations) (Table B.8, No.50).

Co-ordinated research programmes

Table B.7

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Behaviour of advanced reactor pressure vessel steels	-	10	1977	1983
2. Codes adaptable to small or medium-size computers in developing countries for in-core fuel management	4	3	1981	1985

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table B.8

No.	Document	Users	Source	Year of issue	Paragraph
1.	Updated version of EEDB	Secretariat for advising Atomic Energy Commissions and planning organizations in Member States	Statistical data	Annually	B.1.1/6
2.	Reference Data Series No.1	As above	Use of EEDB	Annually	B.1.1/6
3.	Improved version of the MAED methodology for energy demand analysis	As above	Consultants	1983	B.1.1/7
4.	IAEA-TECDOC on methodologies for projecting energy, electricity and nuclear power demands	As above	TC 83/1 TC 84/1	1984	B.1.1/8
5.	Report on comparative economic status of nuclear power	Atomic Energy Commissions and utilities, especially in developing countries; Secretariat for use in nuclear power planning studies	AG 84/2	Annually	B.1.2/5
6.	Review of experience with capital investment costs of electrical power plants	As above	AG 83/2	Biennially, from 1983	B.1.2/6
7.	IAEA-TECDOC on economic status of small and medium power reactors	As above	AG 84/3	1984	B.1.2/6

Table B.8

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
8.	IAEA-TECDOC on trends in costs of nuclear raw materials and fuel cycle services	As above		Annually	B.1.2/7
9.	Guidebook on economic evaluation of bids for nuclear power plants	Atomic Energy Commissions and utilities, especially in developing countries	Consultants	1983	B.1.2/8
10.	IAEA-TECDOC on technical and economic status of new power generation and energy storage technologies	As above; Secretariat, for use in nuclear power planning studies	AG 84/4	1984	B.1.2/9
11.	Guidebook on electrical generation system expansion planning	As above	Consultants AG 83/3	1983	B.1.3/5
12.	IAEA-TECDOC: Users' guide to WASP-IV program for generation system expansion planning	As above		1983	B.1.3/6
13.	Report on the potential role of nuclear power to supply electricity in large urban areas in developing countries	Planning organizations; energy ministries; utilities in developing countries	AG 84/5	1985	B.2.1/3
14.	Guidebook on grid rigidity requirements for nuclear power plant introduction	Electricity system planners; plant operation and regulatory authorities	Consultants AG 83/4	1984	B.2.1/4
15.	Guidelines for the qualification and training of nuclear power plant operations staff	Nuclear power plant owners; regulatory authorities	AG 83/5	1984	B.2.2/3
16.	Guide for nuclear engineering education	Atomic Energy Commissions; universities; ministries of planning and education in developing Member States	AG 84/6	1985	B.2.2/4
17.	Report on the availability of young professionals for nuclear power programmes	Utility planners and personnel divisions; universities and ministries of education	Consultants AG 83/6 TC 84/7	1985	B.2.2/5
18.	Report on infrastructure requirements for effective nuclear technology transfer	Planning authorities in developing Member States	AG 84/8	1985	B.2.3/3
19.	Guidebook on evaluation of industrial support for nuclear power programmes	As above	AG 84/9	1984	B.2.3/3
20.	Proceedings of symposium on experience of nuclear power plant outages	Power plant operators; utility planners	Symposium in 1984	1984	B.2.3/4

Table B.8

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
21.	Report on nuclear heat applications	Atomic Energy Commissions; energy planners	TC 83/7	1984	B.2.4/3 and B.3.1/5
22.	Operating Experience with Power Reactors in Member States	Utilities and electricity authorities; power plant operators; WEC and UNIPEDE	Information from Member States AG 84/10	Annually	B.2.5/4
23.	Operating Experience Performance Analysis Report	As above	As above	Annually	B.2.5/4
24.	Power Reactor Listing	General reference	As above	Annually	B.2.5/4
25.	Reports on IWG-RRPC and IWG-NPPCI meetings	Secretariat; IWG members	IWG 84/11 and 12	1984	B.2.6/3
26.	Report on defect detection and sizing (published by host government or in open literature)	Specialists in supplier, ordering and regulatory organizations	Specialists' meeting 83/8	1983	B.2.6/3
27.	Report on flaw initiation and propagation mechanisms (published by host government or in open literature)	As above	Specialists' meeting 83/9	1983	B.2.6/3
28.	Report on radiation embrittlement surveillance (published by host government or in open literature)	As above	Specialists' meeting 84/13	1984	B.2.6/3
29.	Report on in-service inspection techniques (published by host government or in open literature)	As above	Specialists' meeting 84/14	1984	B.2.6/3
30.	Proceedings of symposium on reliability of reactor pressure components	Power plant designers, manufacturers and operators	Symposium in 1983	1984	B.2.6/3
31.	Report on CRP on radiation behaviour of advanced pressure vessel steels	Power plant designers and operators; regulatory authorities	CRP	1984	B.2.6/3
32.	Report on alarm and disturbance analysis instrumentation (published by host government or in open literature)	Specialists in supplier, ordering and regulatory organizations	Specialists' meeting 83/10	1983	B.2.6/3
33.	Report on the use of computers in safety systems (published by host government or in open literature)	As above	Specialists' meeting 83/11	1983	B.2.6/3

Table B.8

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
34.	Report on the use of simulators (published by host government or in open literature)	As above	Specialists' meeting 84/15	1984	B.2.6/3
35.	Report on human factors engineering in control systems design (published by host government or in open literature)	As above	Specialists' meeting 84/16	1984	B.2.6/3
36.	Manual on techniques for selection of QA programme levels	Nuclear power plant owners, constructors; QA organizations; regulatory authorities	AG 83/12	1983	B.2.7/3
37.	Manual on qualification and certification of QA personnel	As above	AG 84/17	1984	B.2.7/3
38.	Proceedings of QA seminar for Latin America	As above	Seminar in 1983	1984	B.2.7/3
39.	Report on the effectiveness of QA	As above	AG 84/18	1985	B.2.7/4
40.	Proceedings of symposium on fast breeder experience and future trends	Laboratories; programme planners and organizations concerned with fast breeder reactor development	Symposium in 1984	1984	B.3.1/4
41.	Reports of IWGFR meetings	Secretariat; IWG members	IWG 83/13 84/19	1983/84	B.3.1/4
42.	Reports on fast breeder reactor development (published by host government or in open literature)	Specialists on fast breeder reactors	Specialists' meetings 83/14-16 84/20-22	1983/84	B.3.1/4
43.	Report on IWGGCR meeting	Secretariat; IWG members	IWG 84/23	1984	B.3.1/5
44.	Reports on gas-cooled reactor development (published by host government or in open literature)	Specialists on gas-cooled reactors	Specialists' meetings 83/17-18 84/24-25	1983/84	B.3.1/5
45.	IAEA-TECDOC on applications of nuclear process heat to replace fossil fuel	Atomic Energy Commissions; utilities and organizations concerned with high-temperature industrial process heat		1983	B.3.2/5
46.	Reports on role of advanced reactors in world energy supply	Atomic Energy Commissions; planners and institutes concerned with development of nuclear power	AG 83/19 AG 84/26	1985	B.3.2/6

Table B.8

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
47.	IAEA-TECDOC on development status of fusion reactor materials for first-wall and blanket regions	Laboratories; institutes concerned with materials development for fusion reactor design	TC 84/27	1985	B.3.2/7
48.	IAEA-TECDOC on simulation of neutron damage to fusion reactor materials	Laboratories; institutes and programme planners concerned with fusion reactor materials	TC 83/20	1983	B.3.2/7
49.	Proceedings of 1982 ICTP course in reactor theory and power reactors	Course participants; university lecturers in developing countries	ICTP course 1982	1983	B.3.3/4
50.	Computer codes and manuals on in-core fuel management	Universities and institutes in Member States	CRP	1983/84	B.3.3/5

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The references following the meetings are to the relevant paragraph in the programme.

1983		Paragraph
1.	Technical Committee on energy, electricity and nuclear power projections	B.1.1/8
2.	Advisory Group on review of recent experience in power plant investment costs	B.1.2/6
3.	Advisory Group to review guidebook on electrical generation system expansion planning	B.1.3/5
4.	Advisory Group on grid rigidity requirements for introduction of nuclear power plants	B.2.1/4
5.	Advisory Group on selection, qualification and training of operations staff	B.2.2/3
6.	Advisory Group on status and trends in the availability of professionals for nuclear power programmes	B.2.2/5
7.	Technical Committee on nuclear heat applications	B.2.4/3 and B.3.1/5
8.	Specialists' Meeting on defect detection and sizing	B.2.6/3
9.	Specialists' Meeting on flaw initiation and propagation mechanisms	B.2.6/3

1983 (cont.)		Paragraph
10.	Specialists' Meeting on alarm and disturbance analysis instrumentation	B.2.6/3
11.	Specialists' Meeting on the use of computers in safety systems	B.2.6/3
12.	Advisory Group on techniques for selection of quality assurance programme levels	B.2.7/3
13.	Technical Committee (IWG) on fast breeder reactor development	B.3.1/4
14-16.	Specialists' Meetings on fast breeder reactors	B.3.1/4
17-18.	Specialists' Meetings on gas-cooled reactors	B.3.1/5
19.	Advisory Group on the role of advanced systems in the world energy supply	B.3.2/6
20.	Technical Committee on simulation of neutron damage to fusion reactor materials	B.3.2/7

1984		Paragraph
1.	Technical Committee on energy, electricity and nuclear power projections	B.1.1/8
2.	Advisory Group on comparative economic status of nuclear power	B.1.2/5
3.	Advisory Group on economic status of small and medium power reactors	B.1.2/6
4.	Advisory Group on technical and economic status of new power generation and energy storage technologies	B.1.2/9
5.	Advisory Group on electricity supplies to large urban areas in developing countries	B.2.1/3
6.	Advisory Group on nuclear engineering education	B.2.2/4
7.	Technical Committee on improvements in the availability of professionals for nuclear programmes	B.2.2/5
8.	Advisory Group on infrastructure requirements for effective nuclear technology transfer	B.2.3/3
9.	Advisory Group on evaluation of existing and planned industrial support for a nuclear power programme	B.2.3/3
10.	Advisory Group on nuclear power plant performance evaluation	B.2.5/4
11.	Technical Committee (IWG) on reliability of reactor pressure components	B.2.6/3
12.	Technical Committee (IWG) on nuclear power plant control and instrumentation	B.2.6/3

1984 (cont.)		Paragraph
13.	Specialists' Meeting on radiation embrittlement surveillance	B.2.6/3
14.	Specialists' Meeting on reliability of in-service inspection techniques	B.2.6/3
15.	Specialists' Meeting on the use of simulators for training, development and demonstration work	B.2.6/3
16.	Specialists' Meeting on human factors engineering in control systems design	B.2.6/3
17.	Advisory Group on qualification and certification of quality assurance personnel	B.2.7/3
18.	Advisory Group on measuring the effectiveness of quality assurance; relationship of QA/QC to the reliability of nuclear power plants	B.2.7/4
19.	Technical Committee (IWG) on fast breeder reactor development	B.3.1/4
20-22.	Specialists' Meetings on fast breeder reactor development	B.3.1/4
23.	Technical Committee (IWG) on gas-cooled reactor development	B.3.1/5
24-25.	Specialists' Meetings on gas-cooled reactor development	B.3.1/5
26.	Advisory Group on role of advanced reactors in the world energy supply	B.3.2/6
27.	Technical Committee on fusion blanket and first-wall technology	B.3.2/7

C. NUCLEAR FUEL CYCLE

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table C.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 136 412
Consultants	120 917
Overtime	90
Temporary assistance	11 955
Sub-total	1 269 374
Common staff costs	405 964
Travel	58 440
Meetings	
Conferences, symposia, seminars	36 749
Technical committees, advisory groups	211 413
Representation and hospitality	7 789
Scientific and technical contracts	177 438
Common services, supplies and equipment	5 654
Transfer of costs:	
Translation and records services	125 557
Printing and publishing services	463 714
Data processing services	55 669
Conference and contracts services	44 220
TOTAL	2 861 981

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 197 000	106 000	-	106 000	1 303 000	1 445 000	1 561 000
103 100	7 600	-	7 600	110 700	120 300	134 000
800	-	(200)	(200)	600	600	700
1 800	100	200	300	2 100	2 300	2 400
1 302 700	113 700	-	113 700	1 416 400	1 568 200	1 698 100
372 100	45 500	-	45 500	417 600	462 100	499 900
67 900	7 100	-	7 100	75 000	80 700	85 000
85 000	9 000	39 000	48 000	133 000	95 000	184 000
284 000	29 000	(30 000)	(1 000)	283 000	325 000	320 000
9 800	900	-	900	10 700	12 000	13 000
178 500	12 500	8 000	20 500	199 000	291 000	380 000
3 000	300	2 000	2 300	5 300	6 000	7 000
68 000	6 000	(1 000)	5 000	73 000	119 000	134 000
292 000	27 000	49 000	76 000	368 000	408 000	367 000
55 000	5 000	10 000	15 000	70 000	80 000	90 000
69 000	8 000	(18 000)	(10 000)	59 000	65 000	70 000
2 787 000	264 000	59 000	323 000	3 110 000	3 512 000	3 848 000

SUMMARY OF MANPOWER

Table C.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	7	7	7	-	7	7	7
P-4	12	12	13	-	13	13	13
P-3	-	-	-	1	1	1	1
Sub-total	20	20	21	1	22	22	22
GS	12	13	13	-	13	13	13
TOTAL	32	33	34	1	35	35	35

CHANGES IN COSTS AND MANPOWER

Costs

C/1. As will be seen from Table C.1 above, it is expected that the cost of this programme will increase by $323 000, of which $264 000 will be required to cover salary and other price increases and $59 000 will be a programme increase.

C/2. The programme increase of $39 000 in respect of conferences, symposia and seminars is attributable to the fact that the conference on waste management in 1983 takes the place of one symposium. The increase is almost offset by a programme reduction of $30 000 in respect of Technical Committees and Advisory Groups due to a decrease in the number of meetings. A programme increase of $8000 is foreseen in respect of research contracts in the "Nuclear materials and fuel cycle technology" sub-programme, and one of $2000 in respect of common services, supplies and equipment.

C/3. As regards the allocation of service costs, a programme increase of $49 000 is foreseen for printing and publishing services and one of $10 000 for data processing services. Programme decreases are foreseen in respect of translation and records services ($1000) and conference and contracts services ($18 000).

Manpower

C/4. Table C.2 reflects, in the "1982 Adjusted" column, the transfer of one P-4 post to this programme. An explanation is provided in Annex IV.

C/5. For 1983, the addition of one P-3 post will be required in the "Nuclear materials and fuel cycle technology" sub-programme for a geologist/data base manager. It is expected that the post will be occupied in the later part of the year and funded through delayed recruitment for other posts which become vacant during the year.

C/6. No further changes are foreseen for 1984 and 1985.

THE PROGRAMME

OBJECTIVE

C/7. The objective is to promote the exchange of information between Member States on technical, environmental and economic aspects of nuclear fuel cycle technology, to provide assistance to Member States in the planning, implementation and operation of nuclear fuel cycle facilities and to assist in the development of advanced nuclear fuel cycle technology. This will be done in particular by:

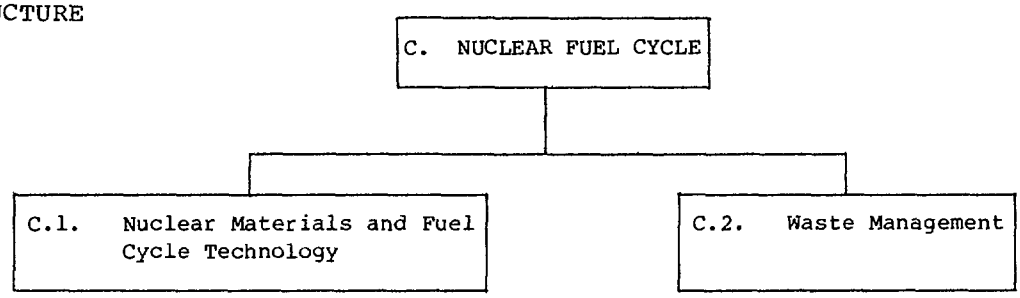
(a) Collecting and disseminating evaluated and systematized information on subjects such as:
  (i) nuclear materials, resources and supply;
  (ii) reactor fuel technology, performance and reliability;
  (iii) spent fuel management;
  (iv) the handling and treatment of radioactive wastes at nuclear fuel cycle facilities;
  (v) the underground disposal of radioactive wastes; and
  (vi) environmental aspects of the nuclear fuel cycle;

(b) Co-operating in the development of guidelines and in the preparation of nuclear fuel cycle safety codes and guides;

(c) Giving interested Member States technical advice in connection with their nuclear fuel cycle programmes; and

(d) Assessing technical and environmental aspects of nuclear fuel cycle development in Member States.

STRUCTURE



C.1.1. Nuclear materials, resources and supply

C.1.2. Reactor fuel technology, performance and reliability

C.1.3. Spent fuel management

C.2.1. Handling and treatment of radioactive wastes

C.2.2. Underground disposal of radioactive wastes

C.2.3. Environmental aspects of nuclear energy

Summary of manpower and costs by sub-programme

Table C.3

Sub-programme	1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Nuclear materials and fuel cycle technology	11.5	6.0	1 319 000	11.5	6.0	1 570 000	11.5	6.0	1 743 000
Waste management	10.5	7.0	1 791 000	10.5	7.0	1 942 000	10.5	7.0	2 105 000
TOTAL	22.0	13.0	3 110 000	22.0	13.0	3 512 000	22.0	13.0	3 848 000

SUB-PROGRAMME C.1

Nuclear materials and fuel cycle technology

OBJECTIVE

C.1/1. The objective is to maintain an up-to-date picture of world uranium and thorium resources and production, to advise developing Member States on the exploration, development and economical exploitation of their indigenous resources, and to collate information on the various stages of the nuclear fuel cycle, including mining, milling, refining, conversion, isotope separation, fuel fabrication, fuel performance and spent fuel management.

PROGRAMME TRENDS FOR 1983-84

C.1/2. The uranium market has recently been characterized by falling demand and decreasing prices. In view of this, there will be a change in the emphasis of the Agency's nuclear materials programme towards such aspects of the uranium industry as the search for uranium deposits capable of producing low-cost ores and the study of methods for increasing the efficiency and improving the economics of both mining and milling operations. Special attention will be given to: uranium geology and metallogenesis; techno-economic feasibility studies of mining and milling; the improvement of resource calculation methods; and the development of improved mining and milling production techniques and refining and conversion technologies. Studies of technologies associated with nuclear materials such as thorium and zirconium will be initiated.

C.1/3. The technology associated with water-reactor fuel has now reached maturity. The emphasis in the programme will be on improving the quality assurance of fuel-element fabrication, increasing the reliability of fuel elements and improving fuel utilization. Work will also continue in connection with the attempts to develop reliable technologies for fast-breeder and advanced reactor fuels.

C.1/4. In view of the increasing amounts of spent fuel being produced by nuclear power plants, the question of the back-end of the fuel cycle is assuming greater importance. The spent fuel management programme will be mainly concerned with technologies for both short-term and long-term storage. Studies will also be initiated on the optimization of storage, transportation and reprocessing.

Nuclear materials and fuel cycle technology

Summary by programme components

Table C.4

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Nuclear materials, resources and supply	6.5	2.6	500 000	50 000	20 000	15 000	585 000
Reactor fuel technology, performance and reliability	3.5	2.7	308 300	21 000	21 000	12 700	363 000
Spent fuel management	1.5	0.7	120 900	32 000	8 000	7 100	168 000
Linguistic services	-	-	-	-	-	9 000	9 000
Printing and publishing services	-	-	-	-	-	114 000	114 000
Data processing services	-	-	-	-	-	60 000	60 000
Conference and contracts services	-	-	-	-	-	20 000	20 000
TOTAL	11.5	6.0	929 200	103 000	49 000	237 800	1 319 000

Nuclear materials, resources and supply (component C.1.1)

Objective

C.1.1/1. The objective is to maintain an up-to-date picture of world uranium and thorium resources and production by collecting and disseminating information on related subjects such as uranium geology, exploration and evaluation techniques, mining and ore processing, and to assist and advise Member States in connection with the exploration and development of their indigenous resources.

Results to date

C.1.1/2. During the period 1978-81, a number of publications on uranium geology, exploration, evaluation and ore processing were prepared as a result of a symposium and other meetings.

C.1.1/3. The NEA/IAEA Working Party on Uranium Resources has issued biennial reports on uranium resources, production and demand; the most recent issue, which includes data up to the end of 1981, has been prepared for publication in early 1982.

C.1.1/4. Guidelines on ore reserve estimations and evaluations were prepared by the NEA/IAEA Steering Group on Uranium Resources, which in 1980 organized a workshop on methodologies for forecasting uranium availability. A manual on forecasting production capabilities has been prepared for publication in 1982.

C.1.1/5. The Joint NEA/IAEA Group of Experts on Research and Development in Uranium Exploration Techniques has continued to work on nine selected projects through corresponding working groups. One of the subject reviews was completed in late 1979 and a report was published in 1981 ("Case Histories in Uranium Exploration"). The other eight NEA/IAEA working groups have prepared material for presentation during a NEA/IAEA symposium in 1982.

C.1.1/6. Six Ad Hoc IAEA Working Groups on Uranium Geology were set up in 1980 to collect and evaluate data, interchange information and prepare material for discussions and for final publication in 1984.

C.1.1/7. The software for the computerized International Uranium Geology Information System (INTURGEO) has been completed and a start is to be made with data entry. The system has been designed for storing information on regional geology, uranium geology and exploration, uranium deposits and national uranium statistics.

C.1.1/8. A meeting on the geology and metallogenesis of South American uranium deposits was held in 1981 in connection with the Eighth Argentine Geological Congress. Comprehensive reports were presented for the Argentinian, Bolivian, Brazilian, Colombian and Peruvian uranium deposits and main occurrences (publication in 1982).

C.1.1/9. Recommendations on specific aspects of uranium exploration in wet tropical environments have been prepared for publication in 1982.

C.1.1/10. Manuals on "Borehole Logging for Uranium Exploration" and "Geochemical Prospecting for Uranium" are being published in 1982.

C.1.1/11. The Joint NEA/IAEA Working Group on Uranium Extraction, organized in 1978, has prepared for publication in 1982 a survey on uranium extraction technology (primarily directed towards developing countries). It is also co-operating with the NEA/IAEA waste management groups in a study of the possibility of reducing tailing disposal problems by the modification of uranium milling flowsheets or operating practices.

Plans for 1983-84

C.1.1/12. A report on the uranium geologies of the South American and African continents, prepared with the aid of consultants, will be published (Table C.7, No.1).

C.1.1/13. A new report on "Uranium Resources, Production and Demand" will be published in 1983 (Table C.7, No.2) after information has been collected and evaluated by the NEA/IAEA Steering Group and Working Party on Uranium Resources.

C.1.1/14. In addition to the manual on production capabilities (C.1.1/4), a report will be prepared with the aim of re-defining uranium resource categories and broadening the coverage on uranium availability in future issues of the NEA/IAEA report (C.1.1/13) (Table C.7, No.3).

C.1.1/15. The conclusions and recommendations of the Ad Hoc Working Groups on Uranium Geology - forming a comprehensive and up-to-date review of all the geological factors controlling the uranium mineralization of different types of deposit - will be published in 1984 (Table C.7, No.4).

C.1.1/16. The INTURGEO facilities will be used to assist Member States with activities related to the uranium industry, from prospecting to uranium production.

C.1.1/17. The subject of uranium deposits in volcanic environments will be reviewed with the aid of consultants in order to gather information which could be used in the search for such deposits (Table C.7, No.5).

C.1.1/18. A review will be made of hydrothermal uranium mineralization of magmatic or non-magmatic origin in order to clarify the paragenesis, metallogenesis and distinctive criteria of the two types of deposits (Table C.7, No.6).

C.1.1/19. A report will be prepared on planning for the evaluation, development and exploitation of uranium deposits, especially in developing countries (Table C.7, No.7).

C.1.1/20. The Joint NEA/IAEA Group of Experts on Research and Development in Uranium Exploration Techniques will continue work in areas defined in 1982 (Table C.7, No.8).

C.1.1/21. Participation in the Joint NEA/IAEA Working Group on Uranium Extraction will continue (Table C.7, No.9); the future programmes of this working group will be directed toward the collection and distribution of information on the technology of uranium ore processing.

C.1.1/22. A manual describing the basic techniques and procedures needed to develop the information required for decisions on the technical and economic feasibility of a given uranium ore processing operation will be prepared with the aid of consultants (Table C.7, No.10).

C.1.1/23. A review of advances in uranium ore processing technology and the recovery of uranium from non-conventional sources will be prepared (Table C.7, No.11).

C.1.1/24. A multilanguage glossary of terms related to uranium ore processing will be prepared with the help of consultants (Table C.7, No.12).

C.1.1/25. Research contract work will continue on: the intercomparison of radiometric calibration pads for uranium exploration; the mineralogy and chemistry related to the metallogenesis of certain uranium deposits; and the extraction of uranium with foamed plastics. Contracts concerned with the development of microcomputer software for ore-reserve estimation will be awarded.

Related activities

C.1.1/26. Support was given to 44 technical co-operation projects in 1981.

C.1.1/27. Six large-scale UNDP-financed uranium exploration projects - in Colombia, Chile, Greece, Madagascar and Peru - were administered or are still in progress and small-scale projects in a further 30 countries (financed either by UNDP or from the Agency's Technical Co-operation Fund) were supervised; in total, around 80 technical co-operation projects were serviced and a large number of fellowship applications and reports were evaluated.

C.1.1/28. A training course on uranium exploration and one on ore-processing were held in 1981.

C.1.1/29. Technical support was provided to the International Uranium Resources Evaluation Project (IUREP): twelve IUREP orientation-phase missions were completed.

New developments foreseen for 1985-88

C.1.1/30. Present uranium market conditions are expected to continue for some years and there is likely to be a shift of emphasis from general uranium exploration to low-cost mining and milling or the search for high-grade uranium sources. Attention will also be given to other nuclear materials such as zirconium.

Co-operation with other organizations

C.1.1/31. Co-operation is maintained with NEA, the raw materials departments of national atomic energy commissions, national and international geological and mining organizations, the International Geological Correlation Programme (sponsored by UNESCO) and IIASA. Co-operation will also continue with CEC uranium resources groups, IEA, the Uranium Institute and other organizations and companies dealing with the front-end of the nuclear fuel cycle.

C.1.1/32. Technical co-operation activities are carried out in liaison with UNDP, the United Nations Revolving Fund for Natural Resources Exploration and the United Nations Centre for Natural Resources, Energy and Transport, multinational-regional resources centres, and also relevant national organizations.

Reactor fuel technology, performance and reliability (component C.1.2)

Objective

C.1.2/1. The objective is to collect and evaluate technological information on the front-end of the nuclear fuel cycle and the operational experience of nuclear fuel cycle facilities and to study and evaluate already commercialized technologies and new processes; to collect, evaluate and arrange for the exchange of information on water-reactor fuel element fabrication, with special emphasis on quality assurance and quality control, and on fuel element performance, behaviour and reliability; to advise developing countries on the establishment of fuel element fabrication facilities and the evaluation of the reliability and safety of fuel elements during operation in the reactor core; and to collect and evaluate research and development information on the manufacturing technology, performance and reliability of advanced fuels for use in different types of reactor.

Results to date

C.1.2/2. A series of reports have been published on the chemistry and the separation of actinides.

C.1.2/3. The first questionnaire requesting basic information on nuclear fuel cycle facilities in Member States was circulated in 1980 and the answers were collected in 1981 for compilation of a technical report (publication in 1982).

C.1.2/4. Preparation of a technical report on ion exchange processes in nuclear fuel cycle technology was initiated in 1981.

C.1.2/5. The International Working Group on Water Reactor Fuel Performance and Technology (IWGFPT) has continued to make recommendations on programme activities and has organized specialists' meetings on: fuel element performance - computer models; internal fuel rod chemistry; fuel behaviour under power ramping and power cycling conditions; the behaviour of failed fuel; fuel element performance and fission gas release modelling; the pellet-cladding interaction for water reactors; and high burn-up in water reactor fuels.

C.1.2/6. A regional seminar on quality control in nuclear fuel technology was organized at Buenos Aires in 1979 and recommendations for Member States were drawn up.

C.1.2/7. A guidebook "Quality Control of Water Reactor Fuel", summarizing the current experience of quality control in fuel fabrication, was prepared and submitted for publication in 1981.

C.1.2/8. A CRP on the interaction of fuel cladding with the water coolant in power reactors is being initiated (Table C.6, No.1) after a survey in 1982.

C.1.2/9. Recommendations on improvements in fuel cladding reliability for various reactor conditions were formulated in 1981.

C.1.2/10. A CRP concerned with the development of computer models for fuel element behaviour in water reactors was started in 1981 (Table C.6, No.2). A programme on the post-irradiation examination of water reactor fuel was formulated in 1982.

C.1.2/11. A survey of experience in spherical particle fuel technology has been carried out with the help of consultants (results to be published in 1982).

Plans for 1983-84

C.1.2/12. Information on the operational status and experience of various nuclear fuel cycle facilities in Member States will be collected by means of questionnaires. The results will be reviewed and a biennial report prepared (Table C.7, No.13).

C.1.2/13. Status reviews will be prepared on the development of chemical processes for the production of heavy water, the recovery of uranium from the seawater and the separation of isotopes (Table C.7, Nos 14-16).

C.1.2/14. Advances in the remote handling technology used in fuel fabrication and recycling facilities will be evaluated at a seminar in 1984 (Annex II(4) and Table C.7, No.17).

C.1.2/15. With the aid of consultants, a report will be prepared on the corrosion, chemical stability and radiation resistance of materials used in nuclear fuel cycle facilities (alloys, non-metals, molten inorganic compounds, organic solvents, ion exchange resins and other materials) (Table C.7, No.18).

C.1.2/16. A review will be made of advances in ion exchange and extraction technology for separation and purification processes employed in the nuclear fuel cycle (Table C.7, Nos 19 and 20).

C.1.2/17. The collection, evaluation, dissemination and exchange of information within the framework of the IWGFPT will continue, with emphasis on improvements in fuel fabrication technology, quality control and fuel behaviour. Work already completed will be reviewed and recommendations for future programmes will be made (Table C.7, No.21).

C.1.2/18. Advances in research related to the interaction between water coolant and fuel cladding will be reviewed (Table C.7, No.22).

C.1.2/19. Problems related to the pellet-cladding interaction for water reactor fuel will form the subject of a technical report (Table C.7, No.23).

C.1.2/20. Reports on fuel element reliability, fuel element behaviour in off-normal and accident conditions and the improvement of water reactor fuel utilization will be published (Table C.7, Nos 24 and 25).

C.1.2/21. The results of practical experience with quality control for water reactor fuel technology will be discussed in 1984 at a topical seminar designed to enable developing countries to consider different approaches to the introduction of effective fuel technologies suited to their own needs (Annex II(5) and Table C.7, No.26).

C.1.2/22. Results obtained within the CRP on the development of computer models for fuel element behaviour in water reactors (Table C.6, No.2) will be published (Table C.7, No.27).

C.1.2/23. The CRP on the influence of reactor water chemistry on fuel cladding reliability (Table C.6, No.1) will continue (Table C.7, No.28).

C.1.2/24. A technical guide (Table C.7, No.29) will be produced in connection with the CRP on the examination of irradiated water reactor fuel (C.1.2/10).

C.1.2/25. A review of experience gained in the development of advanced fuels and their performance in FBRs and other types of advanced reactors will be made (Table C.7, No.30).

Related activities

C.1.2/26. Support was given in 1981 to 20 technical co-operation projects, including one large-scale UNDP project. Training courses on fuel cycle technologies will continue to be given.

New developments foreseen for 1985-88

C.1.2/27. Greater attention will be given to mixed-oxide fuel and other types of fuel for advanced reactors.

Co-operation with other organizations

C.1.2/28. Co-operation will continue with NEA, CEC and IEA in all areas of fuel cycle services and fuel technology. Co-operation is also planned with UNIPEDE and other organizations.

Spent fuel management (component C.1.3)

Objective

C.1.3/1. The objective is to assist interested Member States in technical matters involving the management of spent fuel from various types of reactor by collecting, evaluating and exchanging information on the back-end of the fuel cycle, and specifically on short-, medium- and long-term storage options and transportation, reprocessing and recycling techniques; and to provide assistance in international studies.

Results to date

C.1.3/2. Information on spent fuel management was provided in connection with the INFCE study. Also, technical support was given to the International Spent Fuel Management and International Plutonium Storage studies.

C.1.3/3. In 1978, a NEA/IAEA symposium was organized on the economic and safety aspects of spent fuel storage techniques.

C.1.3/4. Co-operation has been maintained with NEA in research into the effects on spent fuel elements of long-term storage in water. The joint programme resulted in publication of a world survey of experience in this area.

C.1.3/5. An evaluation was made of spent fuel storage alternatives, especially dry storage techniques, and the results published as a technical report in 1981.

C.1.3/6. Preparation of a guidebook on spent fuel storage was initiated in 1981.

Plans for 1983-84

C.1.3/7. The guidebook on spent fuel storage will be finalized and published (Table C.7, No.31).

C.1.3/8. A CRP (Table C.6, No.3) intended to confirm the reliability of wet storage and to review alternative storage techniques will continue until 1984 and the results will be published as a technical document (Table C.7, No.32).

C.1.3/9. The evaluation and optimization of storage, transportation and reprocessing concepts will be examined and the various possible recycling options (including reprocessing technologies and uranium-plutonium recycling) will be reviewed (Table C.7, No.33).

C.1.3/10. A seminar on technical and environmental aspects of spent fuel management will be held in 1983 (Annex I(3)).

C.1.3/11. Technical support will be provided for international spent fuel management studies.

Related activities

C.1.3/12. Support for Agency technical co-operation projects, including projects being executed by the Agency on behalf of UNDP, will continue.

C.1.3/13. Assistance will be made available to Member States interested in establishing regional or multinational fuel cycle centres. A training course on aspects of spent fuel storage and transportation will be held.

Co-operation with other organizations

C.1.3/14. Co-operation with NEA, CEC and IEA will continue. It is planned to establish co-operation with UNIPEDE and other organizations dealing with the back-end of the nuclear fuel cycle.

SUB-PROGRAMME C.2
Waste management

OBJECTIVE

C.2/1. The objective is to review and disseminate information and develop guidance for Member States on the safe and effective management of radioactive wastes in order to ensure the protection of man and his environment. The subjects include in particular: (a) the handling, treatment, conditioning and storage of radioactive wastes arising from the peaceful use of nuclear energy, with emphasis on the nuclear fuel cycle; (b) the underground disposal of radioactive wastes and techniques for maintaining radionuclide releases at acceptable levels; and (c) the evaluation of actual or potential releases and transfers of radionuclides and associated contaminants to man and the environment and the resulting potential impacts.

PROGRAMME TRENDS FOR 1983-84

C.2/2. A comprehensive international conference will be held by the Agency in 1983 to provide a detailed review of the technological, safety, environmental, regulatory, institutional and economic aspects of radioactive waste management necessary for the development of nuclear power (Annex I(4) and Table C.7, No.34).

C.2/3. High importance continues to be given to radioactive waste management in the national programmes of countries using nuclear power, the emphasis being on the attempt to define long-term solutions for waste disposal. On the basis of information obtained from Member States, continued attention will be given under the programme to: (a) the preparation of technical documentation on the management of all types of radioactive wastes; (b) the development of guidelines and technical documents on underground disposal; (c) the assessment of the environmental consequences of nuclear facilities; and (d) the preparation of recommendations concerning radioactive matters under conventions protecting the environment. The exchange of information about research activities in radioactive waste management will be further promoted by the continued annual publication of Waste Management Research Abstracts (Table C.7, No.35).

Table C.5

Waste management

Summary by programme components

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Handling and treatment of radioactive wastes	3.1	2.0	265 700	74 000	62 000	20 300	422 000
Underground disposal of radioactive wastes	3.7	2.0	307 600	163 000	33 000	17 400	521 000
Environmental aspects of nuclear energy	3.7	3.0	331 500	76 000	55 000	18 500	481 000
Linguistic services	-	-	-	-	-	64 000	64 000
Printing and publishing services	-	-	-	-	-	254 000	254 000
Data processing services	-	-	-	-	-	10 000	10 000
Conference and contracts services	-	-	-	-	-	39 000	39 000
TOTAL	10.5	7.0	904 800	313 000	150 000	423 200	1 791 000

Handling and treatment of radioactive wastes (component C.2.1)

Objective

C.2.1/1. The objective is to review, disseminate and promote the exchange of information on the relevant technologies and to develop guidance for the safe and effective handling, treatment, conditioning and storage of radioactive wastes at nuclear facilities so as to help ensure that releases of radionuclides into the environment are minimal and that wastes are reduced in volume and appropriately conditioned for storage and/or disposal. The areas covered include the management of: solid, liquid and gaseous low- and intermediate-level effluents and wastes; high-level and alpha-bearing wastes; and wastes from decontamination and decommissioning.

Results to date

C.2.1/2. This component continued earlier activities concerned with the principles and technologies for the treatment and conditioning of all types of radioactive wastes and with the dissemination of information in these areas to Member States. The updating of earlier technical reports is essentially completed and the new versions are being published. A glossary of radioactive waste management terminology designed to provide uniformity in Agency documents was published in 1982.

C.2.1/3. An IAEA/CEC/NEA symposium in 1982 on the conditioning of radioactive wastes summarizes the conditioning aspects relevant to storage and disposal of all types of wastes. A technical document on conditioning requirements has been prepared to provide guidance for the development of waste acceptance criteria for underground disposal (to be issued in 1983).

C.2.1/4. Progress in the management of alpha-contaminated wastes was reviewed at a symposium held in 1980. Two technical documents were published on the evaluation of solidified high-level waste forms as a result of a CRP (Table C.6, No.4). Work was completed in 1981 (under a CRP) on the assessment of the separation of actinides from high-level and alpha-bearing waste followed by either transmutation or their separate disposal, and a technical report has been prepared for publication in 1982. A technical report was produced on the handling and storage of conditioned high-level waste. The Agency co-operated with WHO in the preparation of a report on the health implications of high-level waste management (1982).

C.2.1/5. Reports have been or are being issued on: (a) the handling of tritium-bearing wastes (1981); (b) the conditioning of low- and intermediate-level radioactive wastes (updating of Technical Reports Series Nos 82 and 116), including techniques and requirements for the handling, interim storage, transportation and disposal of the conditioned wastes; (c) the treatment of low- and intermediate-level solid radioactive wastes (updating of Technical Reports Series No.106); and (d) the treatment of low- and intermediate-level liquid radioactive wastes (updating of Technical Reports Series Nos 78, 87 (1982) and 89 (1983)). A seminar on the management of radioactive wastes from nuclear power plants was held in 1981. A code of practice on the management of radioactive wastes from nuclear power plants has been drafted for further consideration by Member States before publication in 1984. Two technical documents have resulted from CRPs (on the handling of tritium-contaminated effluents and wastes and the treatment of spent ion-exchange resins) which were started in 1978-79 and completed in 1982.

C.2.1/6. The management of gaseous and particulate radioactive wastes from nuclear facilities was considered at an IAEA/NEA symposium on the management of gaseous wastes from nuclear facilities in 1980. Two technical reports on the separation, storage and disposal of krypton-85 and on radioiodine removal in nuclear facilities (Technical Reports Series Nos 199 and 201) were published in 1980; two additional technical reports, on the retention of semi-volatile radionuclides at nuclear facilities and the retention of gaseous radionuclides from nuclear power plants under normal and accident conditions, have been finalized (publication in 1982). A seminar on the testing and operation of off-gas cleaning systems at nuclear facilities was held in 1982. A CRP on the comparison of methods for testing particulate filters, initiated in 1977, is being completed in 1982.

C.2.1/7. The decontamination and decommissioning of nuclear facilities have formed the subjects of a technical document and a technical report (publication in 1981 and 1983, respectively).

Plans for 1983-84

C.2.1/8. The code of practice on the management of radioactive wastes from thermal nuclear power plants, drafted in 1982, will be finalized in 1983 (Table C.7, No.36), and the preparation of a supplementary design guide on facilities for the treatment of liquid and solid waste will be initiated in 1984 (Table C.7, No.37). A review will be made of the techniques and practices used for handling low- and intermediate-level radioactive wastes prior to treatment, and for their transport and storage (Table C.7, No.38). A new CRP on the evaluation of solidified low- and intermediate-level waste forms will be started in 1984. The management of special types of intermediate-level solid wastes (such as reactor components and cladding hulls) will be reviewed (Table C.7, No.39).

C.2.1/9. The CRP on the evaluation of high-level waste forms (Table C.6, No.4) will be completed in 1983 (Table C.7, No.40). Recommendations will be formulated for a new, related programme on the performance of immobilized high-level waste forms and packages under storage and disposal conditions.

C.2.1/10. Guidelines on the design of off-gas and ventilation air cleaning systems (including high-efficiency particulate filters) at nuclear facilities will be developed for a Safety Series document (Table C.7, No.41). Various aspects of the safe conditioning, storage and disposal of iodine-129 will be reviewed (Table C.7, No.42). A CRP dealing with the behaviour and retention of iodine and other airborne radionuclides during abnormal and accident conditions at nuclear facilities will be initiated in 1983.

C.2.1/11. As a follow-up to the review of decommissioning technology in 1981-82, a report (Table C.7, No.43) will be prepared on decontamination methods to permit decommissioning as well as plant modifications or maintenance. In addition, research on the decommissioning and decontamination of nuclear facilities being conducted in Member States will be encouraged through a CRP to be started in 1983.

C.2.1/12. The waste management implications of advanced fission reactors and fusion reactors will be considered with the aid of consultants (Table C.7, No.44).

Related activities

C.2.1/13. Work was started in 1981-82 on training courses in waste management to facilitate and assist in the build-up of expertise in developing countries.

C.2.1/14. Expert advice on projects will continue to be given and study tours and training courses will be arranged.

New developments foreseen for 1985-88

C.2.1/15. Various aspects of alpha-bearing wastes will be considered and the waste management aspects of advanced fission reactors and fusion reactors will be further developed.

Co-operation with other organizations

C.2.1/16. This component involves co-operation with ECE, UNEP, WHO, CEC, NEA, CMEA and UNIPEDE.

Underground disposal of radioactive wastes (component C.2.2)

Objective

C.2.2/1. The objective is to develop internationally acceptable guidelines for the safe underground disposal of radioactive wastes, ranging from deep

geological disposal to disposal at shallow depths and in rock cavities; to collect, review and disseminate technical and regulatory information; and to encourage research and technology development for the safe underground disposal of radioactive wastes. The management of wastes from the mining and milling of uranium and thorium ores is now being included in this component.

Results to date

C.2.2/2. A programme was initiated in 1977 to develop a series of documents on various underground disposal options. The Technical Review Committee on Underground Disposal (TRCUD), a review and advisory body established in 1978, has examined the scope of work and publications within the programme at annual meetings. The programme has been concerned with five areas: (a) generic and regulatory aspects and safety assessments; (b) siting; (c) waste acceptance; (d) repository design and construction; and (e) the operation, shut-down and surveillance of repositories.

C.2.2/3. On the basis of the reviews by TRCUD, publications have been produced on basic guidance and criteria, safety assessments, site investigations, and disposal of low- and intermediate-level waste in shallow ground and rock cavity repositories. A total of 16 documents will have been published or completed for publication by 1982.

C.2.2/4. A symposium on the underground disposal of radioactive wastes, sponsored jointly with the NEA, was held in Finland in 1979.

C.2.2/5. A report on current practices and options for the confinement of mill tailings was published in 1981 (Technical Reports Series No.209). A symposium on the management and disposal of wastes from uranium and thorium mining, with emphasis on mill tailings, was held in 1982 in co-operation with NEA.

Plans for 1983-84

C.2.2/6. The emphasis will be on the further development of documents on waste acceptance, and the preparation of technical documents on specific subjects which support published reports or prepare the background for future reports. Meetings of the TRCUD to review draft documents and activities will be held in 1983 and 1984 (Table C.7, No.45). The latter year will mark the conclusion of the first phase of the programme.

C.2.2/7. Safety Series reports on waste acceptance criteria will be prepared for repositories in shallow ground and rock cavities (Table C.7, Nos 46 and 47). Preparation will start of guidelines on the regulation of underground repositories for low and intermediate-level wastes and of a code of practice on siting, design and operation of radioactive waste repositories in shallow ground.

C.2.2/8. The performance requirements for waste isolation systems will be examined with a view to preparing a technical report on the systems analysis of deep underground disposal (Table C.7, No.48).

C.2.2/9. Information will be collected and reviewed on heat effects, near-field effects and the results of in situ experiments for deep geological disposal (Table C.7, Nos 49 and 50). A technical document will be produced on experience in developing and operating waste disposal facilities in rock cavities (Table C.7, No.51).

C.2.2/10. A seminar on safety assessments and related site investigations for underground disposal of radioactive wastes will be held in 1984 (Annex II(6) and Table C.7, No.52).

C.2.2/11. Four CRPs will be initiated, on: near-field effects of high-level waste disposal; the geochemistry of neptunium; the verification of models for the long-term dispersion of radionuclides from repositories; and the migration and dispersion of radionuclides from waste packages disposed of in shallow ground repositories.

C.2.2/12. The Code of Practice and Guide to the Code (Safety Series No.44, 1976) on the Management of Wastes from the Mining and Milling of Uranium and Thorium Ores will be revised (Table C.7, No.53).

Related activities

C.2.2/13. Assistance in the selection and safety assessment of underground disposal systems will be provided on request.

New developments foreseen for 1985-88

C.2.2/14. On the basis of the supporting technical documents mentioned above, the preparation will begin of Safety Series documents on waste acceptance criteria for deep geological disposal and on the design, construction, operation and shut-down of deep geological repositories.

C.2.2/15. It is planned to prepare three codes on the following disposal options: (a) shallow ground repositories; (b) rock cavity repositories; and (c) newly mined deep geological repositories. These will cover regulation, siting, design, construction, operation and shut-down.

C.2.2/16. The feasibility of setting up international and multi-national underground waste repositories will be considered if requested by interested countries.

C.2.2/17. Questions of cost and timing for the implementation of one or more of the options for safe underground disposal of radioactive wastes will be discussed.

Co-operation with other organizations

C.2.2/18. Co-operation with NEA, CEC, UNEP and CMEA will continue.

Environmental aspects of nuclear energy (component C.2.3)

Objective

C.2.3/1. The objectives are: (a) to collect, review and encourage the development of data and models relating to the environmental dispersion and behaviour of radionuclide releases; (b) to develop methodologies for the environmental impact assessment of nuclear facility operations; (c) to keep under review the Agency's Definition and Recommendations under the London Dumping Convention and to develop recommendations on radioactive matters related to other conventions for protection of the environment.

Results to date

C.2.3/2. A review of generic models and data for assessing the environmental transfer of radionuclides to man was published in 1982. A symposium held in 1981 provided for a major review of the migration in the terrestrial environment of long-lived radionuclides released from the nuclear fuel cycle.

C.2.3/3. The results obtained under CRPs on the behaviour of tritium in some typical ecosystems, the behaviour of radium in aquifers and waterways, the cycling of transuranium elements in the marine environment, and the dispersion of radionuclides from the storage of radioactive waste in the terrestrial environment have been published as Technical Reports (1981) or prepared for publication as technical documents (1982).

C.2.3/4. Technical documents have been prepared on the environmental transfer and regional and global behaviour of radionuclides released from the nuclear fuel cycle and of the models and radiological basis for recommending

the control of such environmental releases of regional and global concern. Atmospheric dispersion models relating to radionuclide discharges are being reviewed in 1982.

C.2.3/5. The Agency's revised Definition of radioactive waste unsuitable for dumping at sea and Recommendations for radioactive waste not coming under this Definition have been operative under the terms of the London Dumping Convention since 1978. The Agency initiated a review of its Definition by requesting GESAMP (United Nations Joint Group of Experts on the Scientific Aspects of Marine Pollution) to recommend the most appropriate oceanographic model and by holding an Advisory Group in 1982 to assess the radiological basis underlying the Definition.

C.2.3/6. To prepare additional guidelines for the future revision of the Agency's Recommendations, reviews have been made of: the definition of de minimis quantities of radioactive wastes which could be dumped as non-hazardous waste under a general permit; the packaging requirements for sea dumping (1982); and the development of methodologies for the environmental assessment of sea dumping operations and the justification of sea dumping in place of land-based alternatives.

C.2.3/7. A symposium on the impact of radionuclide releases into the marine environment was held in 1980. The previous Safety Series No.5 "Radioactive Waste Disposal into the Sea" is being replaced (in 1982/83) by a Safety Series report on the protection of the marine environment from radioactive waste disposal into the sea, which summarizes the current information and requirements a Member State should consider when disposing low-level waste into the sea.

C.2.3/8. Reviews have been made of hydrodynamic models and of the behaviour of pollutants in coastal zones in connection with the problem of defining de minimis quantities of low-level waste for dumping at sea.

C.2.3/9. The consideration given in co-operation with UNEP to possible comparisons between the environmental impacts of nuclear energy and those of other energy sources has shown that insufficient data are available. A publication on nuclear power and the environment has been revised in co-operation with WHO.

Plans for 1983-84

C.2.3/10. Work will start on the preparation of a general methodology for assessing the environmental impact of nuclear facilities to provide guidance for the appropriate national authorities (Table C.7, No.54).

C.2.3/11. The Agency will continue to discharge its responsibilities regarding radioactivity matters under the London Dumping Convention. On the basis of the recommendations of the GESAMP Working Group on an Oceanographic Model for the Dispersion of Waste Disposed of at Deep Sea (available in 1983) and of an Advisory Group in 1982 concerning the radiological basis, the data base for the Agency's Definition of radioactive waste unsuitable for dumping and its Recommendations for dumping of low-level waste into the deep sea will be reviewed (Table C.7, No.55) and a revised version of the Definition and Recommendations prepared (Table C.7, No.56) and completed for submission to the Contracting Parties of the Convention by 1985. The attempt to define de minimis quantities of radioactive waste exempted from special permits in the case of dumping at sea will be continued (Table C.7, No.57).

C.2.3/12. In the light of earlier results on models and parameters for the environmental transfer and the regional and global behaviour of radionuclides from the nuclear fuel cycle and on the basis of the new Basic Safety Standards for Radiological Protection, technical recommendations for the control of radiologically significant radionuclides to prevent transboundary air pollution by radioactive substances will be prepared (Table C.7, No.58).

C.2.3/13. Work will continue through new and existing CRPs (Table C.6, No.5) on collecting and verifying data and models concerning the migration and dispersion of radionuclides through atmospheric, aquatic and terrestrial pathways to man - in particular as related to transportation through sediments, the atmospheric dispersion of radiologically significant radionuclides of regional and global concern, and the environmental migration of radium and other contaminants from uranium mining and milling wastes. A seminar on the environmental transfer of radionuclides to man will be held in 1983 (Annex I(5) and Table C.7, No.59). Further attention will be given to defining de minimis levels for very low-level solid radioactive waste which could be considered for the purpose of disposal into the terrestrial environment as non-hazardous (Table C.7, No.60).

C.2.3/14. The beneficial aspects of thermal releases from nuclear facilities will be reviewed (Table C.7, No.61).

Related activities

C.2.3/15. Assistance with environmental studies and environmental assessments in relation to waste disposal and effluent discharges will be provided on request.

New developments foreseen for 1985-88

C.2.3/16. The environmental impact of advanced reactors (including fusion reactors) and their fuel cycles will be analysed.

C.2.3/17. Recommendations on radioactive waste questions will be developed, as required, for regional or global conventions protecting the environment from long-range transboundary air or water pollution.

C.2.3/18. The revision of the Agency's Definition and Recommendations for the London Dumping Convention will be completed. The revised versions are expected to become effective in 1986.

Co-operation with other organizations

C.2.3/19. The environmental programme involves co-operation with many intergovernmental and non-governmental organizations, especially those within the United Nations system such as UNEP, UNSCEAR, IMCO, GESAMP, FAO, WHO and WMO. There is also considerable interaction with NEA and CEC.

Co-ordinated research programmes

Table C.6

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Investigation of fuel element cladding interaction with the water coolant in power reactors	1		1982	1985
2. Development of computer models for fuel element behaviour in water reactors		1	1981	1984
3. BEFAST - Behaviour of spent fuel assemblies during extended storage	1	3	1981	1986
4. Evaluation of solidified high-level waste forms	-	11	1976	1983
5. Environmental migration of radium and other contaminants present in solid and liquid wastes from the mining and milling of uranium	3	5	1981	1984

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table C.7

No.	Document	Users	Source	Year of issue	Paragraph
1.	Report on correlation of uranium geology between Africa and South America	Governments and organizations concerned with uranium exploration	Consultants	1983	C.1.1/12
2.	NEA/IAEA Report on Uranium Resources, Production and Demand (published by NEA)	Uranium producers and consumers; ministries of energy and/or mines; Atomic Energy Commissions	TC 83/1 and 84/1	Every 2 years from 1983	C.1.1/13
3.	Report on uranium resources and availability	As above		1984	C.1.1/14
4.	Reports of the Working Groups on Uranium Geology	Governments and organizations interested in uranium exploration	Working groups 83/2-3 84/2	1984/85	C.1.1/15
5.	Technical Report on uranium deposits in volcanic environments	As above	TC 83/4	1984	C.1.1/17
6.	Technical Report on hydro-thermal uranium mineralization	As above	Specialists' meeting 84/3	1985	C.1.1/18
7.	Technical Report on planning for evaluation, development and exploitation of uranium deposits	Governments; organizations interested in uranium production	Consultants	1985	C.1.1/19

Table C.7

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
8.	Report of NEA/IAEA Group of Experts meeting	As above	NEA/IAEA 84/4	1984	C.1.1/20
9.	Summary report of Joint NEA/IAEA Working Group on Uranium Extraction	NEA/IAEA Secretariats	NEA/IAEA 84/5	1984	C.1.1/21
10.	Manual on uranium ore process-development studies (laboratory techniques)	Relevant technical personnel in developing countries	Consultants	1984	C.1.1/22
11.	Technical Report on advances in uranium processing technologies and recovery of uranium from non-conventional sources	Governments; organizations interested in uranium production	TC 83/5	1984	C.1.1/23
12.	Multilingual glossary of uranium ore processing terms	As above	Consultants	1983	C.1.1/24
13.	Updated version of Nuclear Fuel Cyle Facilities, Operational Status	Secretariat for advising Atomic Energy Commissions and planning organizations in Member States	Question-naire; Consultants	1984	C.1.2/12
14.	Technical Report on heavy-water production	As above	Consultants	1983	C.1.2/13
15.	Technical Report on uranium recovery from seawater	Secretariat; research institutes and production facilities	Consultants Specialists' meeting 84/6	1984	C.1.2/13
16.	IAEA-TECDOC on isotope separation	Agency Secretariat; planning organizations in Member States	Consultants	1984	C.1.2/13
17.	Technical Report on advances in remote handling technology	Secretariat; research institutes and production facilities	Seminar in 1984; Consultants	1985	C.1.2/14
18.	Technical Report on chemical stability and radiation resistance of materials used in nuclear fuel cycle facilities	As above	Consultants	1985	C.1.2/15
19.	IAEA-TECDOC on ion exchange technology for the nuclear fuel cycle	As above	Specialists' meeting 83/6	1983	C.1.2/16
20.	IAEA-TECDOC on extraction technology for separation and purification in the nuclear fuel cycle	As above	Specialists' meeting 84/7	1985	C.1.2/16
21.	Summary report on IWGFPT meeting	Agency Secretariat; member countries of IWGFPT	IWGFPT 83/7	1983	C.1.2/17

Table C.7

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
22.	Technical Report on effect of water chemistry on fuel cladding reliability	As above	Specialists' meeting 83/8 Consultants	1983	C.1.2/18
23.	Technical Report on pellet-cladding interaction in water reactor fuel	As above	Specialists' meeting 83/9	1983	C.1.2/19
24.	Technical Report on reactor fuel behaviour in off-normal and accident conditions	As above	Specialists' meeting 83/10	1983	C.1.2/20
25.	Technical Report on improvements in fuel design for better fuel utilization in water reactors	As above	Specialists' meeting 84/8	1984	C.1.2/20
26.	Proceedings of seminar on quality control in water reactor fuel technology	As above	Seminar in 1984	1985	C.1.2/21
27.	Technical Report on water reactor fuel computer modelling	As above	CRP; Specialists' meeting 84/9 Consultants	1984	C.1.2/22
28.	Technical guide on water chemistry and fuel cladding reliability	As above	CRP; Consultants	1984	C.1.2/23
29.	Technical guide on improvement of water reactor fuel reliability and safety	As above	CRP; Consultants	1984	C.1.2/24
30.	Technical Report on experience in fabrication and performance of advanced fuels	As above	Specialists' meeting 84/10 Consultants	1985	C.1.2/25
31.	Guidebook on spent fuel storage	Nuclear power reactor operators; Atomic Energy Authorities; designers	Consultants	1983	C.1.3/7
32.	Technical Report on spent fuel storage techniques	As above	CRP; Consultants	1985	C.1.3/8
33.	IAEA-TECDOC on aspects of spent fuel management to be determined in 1982	As above	Specialists' meeting 84/11	1985	C.1.3/9
34.	Proceedings of IAEA Conference on Radioactive Waste Management	National regulatory bodies; technical and administrative personnel responsible for national waste management programmes; international organizations	Conference in 1983	1983/84	C.2/2

Table C.7

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
35.	Waste Management Research Abstracts	Research institutes	Information provided by Member States	Annually	C.2/3
36.	Safety Series Code of Practice on the management of radioactive wastes from nuclear power plants	National regulatory bodies; national waste management authorities; international organizations	AG 83/11 Submission to the Board in 1984	1984	C.2.1/8
37.	Safety Series Guide on design of low- and intermediate-level liquid and solid waste treatment facilities at nuclear power plants	As above	AG 84/12	1985	C.2.1/8
38.	Technical Report on practices and techniques for handling, transport and storage of low- and intermediate-level wastes prior to treatment	As above	AG 84/13	1985	C.2.1/8
39.	Technical Report on management of cladding hulls and fuel hardware	As above	TC 84/14	1985	C.2.1/8
40.	Technical Report on evaluation of high-level waste forms	As above; research institutions	CRP	1984	C.2.1/9
41.	Safety Series Guide on design of off-gas and ventilation air cleaning systems at nuclear facilities	As above	AG 83/12	1985	C.2.1/10
42.	Technical Report on conditioning, storage and disposal of iodine-129	As above	TC 84/15	1985	C.2.1/10
43.	Technical Report on decontamination of nuclear facilities for plant decommissioning, modification or maintenance	As above	TC 83/13	1984	C.2.1/11
44.	Internal report on waste management aspects of advanced fission and fusion reactors	Secretariat	Consultants	1985	C.2.1/12
45.	Review of documents and activities of the underground disposal programme	National regulatory bodies; national waste management authorities; international organizations	TC 83/14 and 84/16	1984	C.2.2/6
46.	Safety Series report on waste acceptance criteria for disposal of radioactive waste in shallow ground	As above	AG 84/17 (TC 84/16)	1985	C.2.2/7

Table C.7

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
47.	Safety Series report on waste acceptance criteria for disposal of radioactive waste in rock cavities	As above	AG 84/18 (TC 84/16)	1985	C.2.2/7
48.	Technical Report on performance requirements for waste isolation systems in underground disposal	As above	TC 83/15 (TC 83/14)	1984/85	C.2.2/8
49.	IAEA-TECDOC on effects of heat from radioactive waste disposal in deep geological repositories	As above	TC 83/16	1984	C.2.2/9
50.	IAEA-TECDOC on studies relating to near-field effects in deep geological disposal systems	As above	AG 83/17 (TC 84/16)	1984	C.2.2/9
51.	IAEA-TECDOC on experience in developing and operating waste disposal facilities in rock cavities	As above	TC 84/19	1984	C.2.2/9
52.	IAEA-TECDOC: Proceedings of seminar on safety assessment methods for underground disposal of radioactive waste	As above	Seminar in 1984	1984/85	C.2.2/10
53.	Safety Series Code of Practice and Guide on the Management of Wastes from the Mining and Milling of Uranium and Thorium Ores	As above	AG 83/18 and 84/20 Submission to Board 1984	1985	C.2.2/12
54.	Safety Series report on general methodology for assessment of the environmental impact of nuclear facilities	As above	AG 83/19	1984/85	C.2.3/10
55.	IAEA-TECDOC on data base for the revision of the Agency's Definition and Recommendations for radioactive matters under the London Dumping Convention	As above	TC 83/20	1984	C.2.3/11
56.	IAEA-INFCIRC: Revised IAEA Definition and Recommendations on radioactive matters for the purposes of the London Dumping Convention	As above	AG 84/21 Submission to Board in 1985	1985	C.2.3/11
57.	IAEA-TECDOC on de minimis quantities of radioactive waste exempted from special permits for dumping at sea	As above	AG 83/21	1984	C.2.3/11

Table C.7

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
58.	Safety Series Recommendations for the control of atmospheric releases of radionuclides of long-range transboundary significance	As above	AG 84/22	1985	C.2.3/12
59.	IAEA-TECDOC, Proceedings of seminar on environmental transfer of radionuclides to man	As above	Seminar in 1983	1984	C.3.2/13
60.	IAEA-TECDOC on de minimis levels for low-level waste for disposal into the terrestrial environment	As above	AG 84/23	1984	C.2.3/13
61.	IAEA-TECDOC on utilizing thermal releases from nuclear facilities	As above	TC 84/24	1985	C.2.3/14

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983		Paragraph
1.	NEA/IAEA Steering Group and Working Party on Uranium Resources	C.1.1/13
2-3.	Working Groups on Uranium Geology	C.1.1/15
4.	Technical Committee on uranium deposits in volcanic environments	C.1.1/17
5.	Technical Committee on advances in uranium ore processing technology and the recovery of uranium from non-conventional sources	C.1.1/23
6.	Specialists' Meeting on ion exchange technology for separation and purification in the nuclear fuel cycle	C.1.2/16
7.	International Working Group on Fuel Performance and Technology (IWGFPT)	C.1.2/17

1983 (cont.)		Paragraph
8.	Specialists' Meeting on effect of water chemistry on fuel cladding behaviour in power reactors	C.1.2/18
9.	Specialists' Meeting on pellet-cladding interaction in water reactor fuel	C.1.2/19
10.	Specialists' Meeting on reactor fuel behaviour in off-normal and accident conditions	C.1.2/20
11.	Advisory Group on Code of Practice on the management of radioactive wastes from nuclear power plants	C.2.1/8
12.	Advisory Group on the design of off-gas and ventilation air cleaning systems at nuclear facilities	C.2.1/10
13.	Technical Committee on decontamination of nuclear facilities to permit plant decommissioning, modification or maintenance	C.2.1/11
14.	Technical Review Committee on Underground Disposal of Radioactive Wastes (TRCUD)	C.2.2/6
15.	Technical Committee on analysis of the performance requirements for waste isolation systems in underground disposal	C.2.2/8
16.	Technical Committee on effects of heat from radioactive waste in deep geological repositories	C.2.2/9
17.	Advisory Group on studies relating to near-field effects in deep geological disposal systems	C.2.2/9
18.	Advisory Group on Revision of Code of Practice and Guide on the Management of Wastes from the Mining and Milling of Uranium and Thorium Ores	C.2.2/12
19.	Advisory Group on general methodology for assessment of the environmental impact of nuclear facilities	C.2.3/10
20.	Technical Committee on the data base for the revision of the Agency's Definition and Recommendations for radioactive matters under the London Dumping Convention	C.2.3/11
21.	Advisory Group on definition of de minimis quantities of radioactive waste exempted from special permits under the London Dumping Convention	C.2.3/11

1984		Paragraph
1.	NEA/IAEA Steering Group and Working Party on Uranium Resources	C.1.1/13
2.	Working Group on Uranium Geology	C.1.1/15
3.	Specialists' Meeting on hydrothermal uranium mineralization	C.1.1/18
4.	NEA/IAEA Group of Experts on Research and Development in Uranium Exploration Techniques	C.1.1/20
5.	NEA/IAEA Working Group on Uranium Extraction	C.1.1/21

1984 (cont.)		Paragraph
6.	Specialists' Meeting on developments in uranium recovery from seawater	C.1.2/13
7.	Specialists' Meeting on extraction technology for separation and purification in the nuclear fuel cycle	C.1.2/16
8.	Specialists' Meeting on improvements in fuel design for better fuel utilization	C.1.2/20
9.	Specialists' Meeting on computer modelling for water reactor fuel behaviour	C.1.2/22
10.	Specialists' Meeting on advanced fuel technology and performance	C.1.2/25
11.	Specialists' Meeting on spent fuel management	C.1.3/9
12.	Advisory Group on design of low- and intermediate-level liquid and solid waste treatment facilities at nuclear power plants	C.2.1/8
13.	Advisory Group on techniques and practices for handling, transport and storage of low- and intermediate-level wastes prior to treatment	C.2.1/8
14.	Technical Committee on the management of cladding hulls and fuel hardware	C.2.1/8
15.	Technical Committee on the conditioning, storage and disposal of iodine-129	C.2.1/10
16.	Technical Review Committee on Underground Disposal of Radioactive Wastes (TRCUD)	C.2.2/6
17.	Advisory Group on waste acceptance criteria for disposal of radioactive waste in shallow ground	C.2.2/7
18.	Advisory Group on waste acceptance criteria for disposal of radioactive waste in rock cavities	C.2.2/7
19.	Technical Committee on experience in developing and operating waste disposal facilities in rock cavities	C.2.2/9
20.	Advisory Group on Code of Practice and Guide on Management of Wastes from the Mining and Milling of Uranium and Thorium Ores	C.2.2/12
21.	Advisory Group on Revision of the Agency's Definition and Recommendations on radioactive matters for the London Dumping Convention	C.2.3/11
22.	Advisory Group on recommendations for the control of atmospheric releases of radionuclides of long-range transboundary significance	C.2.3/12
23.	Advisory Group on determining de minimis levels for very low-level waste for disposal into the terrestrial environment	C.2.3/13
24.	Technical Committee on utilizing thermal releases from nuclear facilities	C.2.3/14

D. NUCLEAR SAFETY

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table D.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 472 007
Consultants	96 445
Overtime	9 368
Temporary assistance	7 446
Sub-total	1 585 266
Common staff costs	526 490
Travel	92 739
Meetings	
Conferences, symposia, seminars	72 399
Technical committees, advisory groups	352 717
Representation and hospitality	9 774
Scientific and technical contracts	176 596
Scientific supplies and equipment	49 909
Common services, supplies and equipment	32 388
Other items of expenditure	-
Transfer of costs:	
Translation and records services	516 953
Printing and publishing services	686 023
Data processing services	62 438
To other: PNE	(29 000)
Conference and contracts services	65 616
TOTAL	4 200 308

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 689 000	156 000	16 000	172 000	1 861 000	2 120 000	2 249 000
171 600	12 200	(45 800)	(33 600)	138 000	196 600	203 600
16 100	1 200	(5 300)	(4 100)	12 000	17 000	17 000
2 100	200	21 700	21 900	24 000	16 000	3 000
1 878 800	169 600	(13 400)	156 200	2 035 000	2 349 600	2 472 600
523 700	66 800	5 000	71 800	595 500	677 900	720 200
114 600	12 400	50 000	62 400	177 000	245 400	260 100
65 000	7 000	87 000	94 000	159 000	136 000	185 000
640 000	70 000	(196 000)	(126 000)	514 000	730 000	730 000
11 400	900	-	900	12 300	18 100	17 700
315 000	20 000	(38 000)	(18 000)	297 000	258 000	300 000
52 200	6 300	(5 000)	1 300	53 500	56 000	61 500
56 600	5 900	13 200	19 100	75 700	58 000	118 900
700	100	15 200	15 300	16 000	16 000	18 000
436 000	42 000	22 000	64 000	500 000	528 000	484 000
546 000	50 000	78 000	128 000	674 000	790 000	770 000
43 000	4 000	62 000	66 000	109 000	132 000	163 000
-	-	-	-	-	-	-
79 000	9 000	(5 000)	4 000	83 000	89 000	96 000
4 762 000	464 000	75 000	539 000	5 301 000	6 084 000	6 397 000

SUMMARY OF MANPOWER

Table D.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	12	13	13	-	13	13	13
P-4	10	10	10	1	11	12	12
P-3	3	3	3	-	3	3	3
Sub-total	26	27	27	1	28	29	29
GS	20	20	20	1	21	21	21
TOTAL	46	47	47	2	49	50	50

CHANGES IN COSTS AND MANPOWER

Costs

D/1. As will be seen from Table D.1 above, the cost of this programme is expected to increase by $539 000, of which $464 000 will be required to cover salary and other price increases and $75 000 will be a programme increase.

D/2. The programme increase of $21 000 in respect of salaries and common staff costs is the net result of the addition of one GS post for a secretary for the programme and of a P-4 post in the "Safety of nuclear installations" sub-programme, partly offset through delayed recruitment.

D/3. Programme decreases are foreseen in respect of consultants' services ($45 800) and overtime ($5300); these are offset by programme increases in respect of temporary assistance ($21 700) and travel in the "Radiological safety" and "Safety of nuclear installations" sub-programmes ($50 000). The programme increase of $87 000 for conferences, symposia and seminars is attributable to the increase in the number of meetings planned. Owing to a decrease in the number of Technical Committee and Advisory Group meetings, a programme reduction of $196 000 is foreseen under this item. A programme decrease of $38 000 in respect of scientific and technical contracts is foreseen in the two components dealing with radiological protection of workers and of the general public. A programme decrease of $5000 occurs under scientific supplies and equipment.

D/4. The programme increase of $13 200 in respect of common services, supplies and equipment is related to the purchase of minicomputers for the "Safety of nuclear installations" and "Radiation protection service" sub-programmes. A programme increase of $15 200 is foreseen for training under "Other items of expenditure", mainly for the "Safety of nuclear installations" sub-programme.

D/5. As regards the allocation of service costs, programme increases are expected in linguistic services ($22 000), printing and publishing services ($78 000) and data processing services ($62 000). A programme decrease of $5000 is foreseen for conference and contracts services.

D/6. As can be seen from Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that the United States Government will contribute an amount of $120 000 to cover the cost of experts it is making available.

Manpower

D/7. As will be seen from Table D.2 above, the addition of one P-4 post and one GS post will be required. Detailed justifications of the new posts are provided in Annex IV.

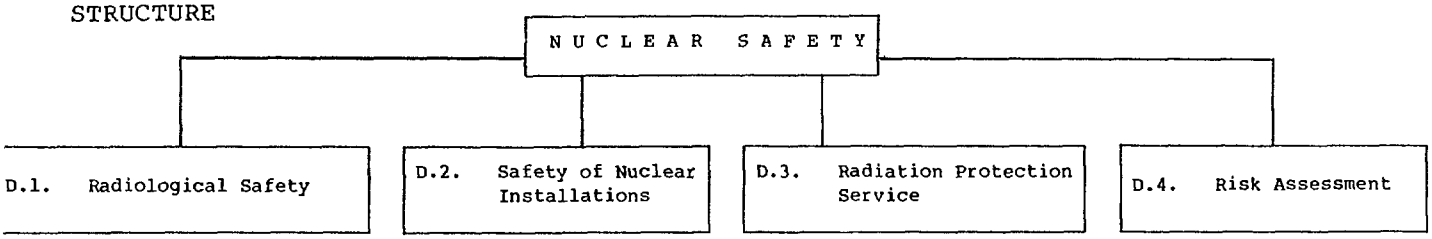
D/8. For 1984, the addition of one P-4 post for a risk assessment officer will be required. No further changes are foreseen for 1985.

THE PROGRAMME

OBJECTIVE

D/9. The objective is to assist in ensuring the safe utilization of nuclear energy and the protection of man and his environment from the harmful effects of nuclear radiation and radioactive releases from nuclear facilities.

STRUCTURE



D.1.1. Radiological protection of workers

D.1.2. Radiological protection of the general public

D.1.3. Safe transport of radioactive materials

D.1.4. Emergency preparedness in support of nuclear facilities

D.1.5. Physical protection of nuclear material

D.2.1. Nuclear safety standards for thermal-neutron nuclear power plants

D.2.2. Nuclear safety standards for research reactors, advanced nuclear power plants and fuel cycle facilities

D.2.3. Advisory services on the safety of nuclear power plants, research reactors and other nuclear facilities

D.2.4. Exchange of information and training

D.2.5. Nuclear reactor safety research and development

D.4.1. Risks and benefits of energy systems

D.4.2. Risk analysis and evaluation

D.4.3. Public attitudes towards nuclear power

Summary of manpower and costs by sub-programme

Table D.3

Sub-programme	1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Radiological safety	10.3	5.7	2 278 000	10.3	5.7	2 584 000	10.3	5.7	2 799 000
Safety of nuclear installations	13.4	5.7	2 276 000	13.4	5.7	2 579 000	13.4	5.7	2 650 000
Radiation protection service	3.1	5.3	402 000	3.1	5.3	461 000	3.1	5.3	486 000
Risk assessment	1.2	4.3	345 000	2.2	4.3	460 000	2.2	4.3	462 000
TOTAL	28.0	21.0	5 301 000	29.0	21.0	6 084 000	29.0	21.0	6 397 000

SUB-PROGRAMME D.1

Radiological safety

OBJECTIVE

D.1/1. The objective is to assist - through the provision of standards, recommendations, guidance and practical assistance - in the further development and harmonization, within Member States, of practices for the protection of workers and the general public against harmful effects of ionizing radiation arising in the peaceful utilization of atomic energy.

PROGRAMME TRENDS FOR 1983-84

D.1/2. A major development in the field of radiation protection was the publication, in 1977, of new ICRP recommendations. The recommendations cover both normal situations, for which ICRP has recommended a dose limitation system aimed at optimizing radiation protection by keeping exposures of individuals and populations "as low as reasonably achievable", and abnormal situations having radiological consequences. The Agency - together with ILO, WHO and NEA - has revised the Agency's Basic Safety Standards for Radiation Protection in order to bring them into line with the new ICRP recommendations and to help Member States in formulating their national radiation protection laws. Also, the Agency has recommended, on the basis of the ICRP dose limitation system, principles for setting limits for the release of radioactive materials into the environment.

D.1/3. The Agency will further develop these principles, the aim being to provide guidance for their practical application. Also, work will continue on the preparation and updating of standards, guides, recommendations and procedures for the radiological protection of workers and the general public and on the harmonization of their implementation in Member States, which will continue to be provided with information and assistance relating to radiation protection methods, procedures, instrumentation, training and research.

D.1/4. Member States will be assisted in implementing the Agency's Regulations for the Safe Transport of Radioactive Materials, which - together with their associated documents - will continue to be kept up to date. The risks associated with the transport of radioactive materials will be evaluated and the problems of the applying ICRP's dose limitation system in this field will be examined.

D.1/5. In view of the increased concern in Member States about the handling of nuclear emergencies, the Agency will step up its activities in the field of nuclear emergency preparedness and assistance, with the formulation of new technical guidance, training programmes and special missions.

Radiological safety
Summary by programme components
Table D.4

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Radiological protection of workers	2.8	1.7	251 600	61 000	115 000	40 400	468 000
Radiological protection of the general public	2.8	1.1	237 900	27 000	92 000	28 100	385 000
Safe transport of radioactive materials	2.1	1.4	197 000	116 000	45 000	13 000	371 000
Emergency preparedness in support of nuclear facilities	2.4	1.5	217 200	30 000	-	66 800	314 000
Physical protection of nuclear material	0.2	-	14 700	23 000	-	300	38 000
Linguistic services	-	-	-	-	-	243 000	243 000
Printing and publishing services	-	-	-	-	-	387 000	387 000
Data processing services	-	-	-	-	-	32 000	32 000
Conference and contracts services	-	-	-	-	-	40 000	40 000
TOTAL	10.3	5.7	918 400	257 000	252 000	850 600	2 278 000

Radiological protection of workers (component D.1.1)

Objective

D.1.1/1. The objective is to provide standards, guides and recommendations related to design criteria, working-environment monitoring, optimization of the protection of workers, and assessment of individual and collective doses.

Results to date

D.1.1/2. Standards, guides and recommendations have been published on: the radiological safety aspects of protecting workers in uranium mining and milling, nuclear fuel fabrication plants, power reactors, hot laboratories, and accelerator and fusion facilities; and the physical and medical surveillance of workers.

D.1.1/3. During the period 1978-82, the proceedings of three symposia and one seminar were published and seven volumes were issued in the Agency's Safety Series:

(a) Revised Basic Safety Standards for Radiation Protection - No.9 (the revision of the Basic Safety Standards, starting in 1977 and completed in 1981, with approval by the Agency's Board of Governors, was a prerequisite for updating other documents in the Safety Series);

(b) Decontamination of Surfaces - No.48;

(c) Radiobiological Surveillance of Airborne Contaminants in the Working Environment - No.49;

(d) Basic Requirements for Personnel Monitoring - Revision of No.14;

(e) Safety Aspects of the Design and Equipment of Hot Laboratories - Revision of No.30;

(f) Early Medical Treatment of Possible Radiation Injury - No.47;

(g) Safety Considerations in the Use of Ports and Approaches by Nuclear Merchant Ships - Revision of No.27 (issued by IMCO as a joint IAEA/IMCO publication).

Also, revision work on six Safety Series volumes ended or neared completion (The Provision of Radiological Protection Services - No.13; Radiation Protection in the Mining and Milling of Radioactive Ores - No.26; Radiation Protection Procedures - No.38; Safe Handling of Plutonium - No.39; Respirators and Protective Clothing - No.22; Medical Supervision of Radiation Workers - No.25), as did the preparation of four new volumes, on: neutron monitoring for radiological protection services; the safe use of radioactive sources and tracers in work relating to food and agriculture; safety aspects of the design and equipment of radioisotope laboratories; and the assessment of internal exposures).

D.1.1/4. Five reports were issued in the Technical Reports Series:

(a) Particle Size Analysis in Estimating the Significance of Airborne Contamination - No.179;

(b) Compendium of Neutron Spectra in Criticality Accident Dosimetry - No.180;

(c) Treatment of Incorporated Transuranium Elements - No.184;

(d) Radiological Safety Aspects of the Operation of Linear Accelerators - No.188; and

(e) Dosimetry for Criticality Accidents: a Manual - No.211.

Also, work neared completion on a Technical Reports Series document dealing with radiological safety aspects of the operation of proton accelerators.

D.1.1/5. A CRP on cell membrane probes as biological indicators of radiation injury was completed in 1980 (results published in 1982). Co-ordinated research programmes on the use of chromosomal aberration analysis in the radiation protection of occupationally exposed workers and on the intercomparison of plutonium intake data obtained by using a chest phantom for lung monitoring were initiated (Table D.8, Nos 1 and 2). The need for a CRP on modelling uranium mines from the viewpoint of radiation protection is being reviewed.

D.1.1/6. Summary reports from Member States on research related to the radiological protection of workers have been issued in Health Physics Research Abstracts.

D.1.1/7. In 1978 the Agency, in co-operation with NEA, sent a questionnaire to all Member States operating nuclear power plants in order to collect data for an assessment of individual and collective occupational exposures; the findings were reviewed in 1979.

Plans for 1983-84

D.1.1/8. Work will continue on preparing and revising standards, recommendations and procedures in the light of ICRP's new recommendations as modified and expanded in 1978 and 1979 and of the revised Basic Safety Standards for Radiation Protection:

(a) A manual on control measures for limiting radiation exposures in the mining and milling of radioactive ores will be prepared (Table D.9, No.1);

(b) The Manual on Radiological Safety in Uranium and Thorium Mines and Mills (Safety Series No.43) will be revised (Table D.9, No.2);

(c) Work will begin on revising Technical Reports Series document No.142 on inhalation risks from radioactive contaminants (Table D.9, No.3); and

(d) The 1978-79 study of occupational exposure in nuclear fuel cycle facilities (D.1.1/7) will be up-dated in 1984 (Table D.9, No.4).

D.1.1/9. A study will be made of the dosimetry methods and equipment needed in dealing with nuclear accidents (Table D.9, No.5).

D.1.1/10. Methods used at uranium and thorium mines and mills for the measurement of radium and its daughter products, personnel monitoring and bioassay, ventilation, engineering and record keeping will be reviewed in 1983 at a regional seminar for Africa (Annex I(6) and Table D.9, No.6). Up-to-date information on doses to workers (and the public) from incorporated radioactive material will be reviewed at a symposium in 1984 (Annex II(7) and Table D.9, No.7).

Related activities

D.1.1/11. In 1981 support was provided for eight technical co-operation projects; in addition, two technical co-operation missions (to the Libyan Arab Jamahiriya and Niger) were organized and lecturers were provided for six training courses. It is expected that the scale of such activities will increase slightly.

D.1.1/12. A regional training course on the diagnosis and early medical treatment of radiation injury will be organized in 1984 for participants from countries in the Far East and the Pacific region.

New developments foreseen for 1985-88

D.1.1/13. Towards the end of this period, the Agency will identify areas where changes in ICRP's basic recommendations may have become necessary.

Co-operation with other organizations

D.1.1/14. Co-operation will be maintained with ICRP, UNSCEAR, WHO, ILO, ECE, ISO, NEA and CMEA.

Radiological protection of the general public (component D.1.2)

Objective

D.1.2/1. The objective is to provide standards, guides and recommendations on effluent monitoring, environmental pathway monitoring, assessment of individual and collective doses, and optimization of protection of the public.

Results to date

D.1.2/2. Standards, guides and recommendations have been published on the radiological safety aspects of protecting members of the public, through effluent and environmental monitoring programmes under normal and abnormal conditions.

D.1.2/3. During the period 1978-82, two volumes were published in the Agency's Safety Series (Principles for Establishing Limits for the Release of Radioactive Materials into the Environment - No.45; Monitoring of Airborne and Liquid Radioactive Releases from Nuclear Facilities to the Environment - No.46); two documents were issued in the IAEA-TECDOC series (Environmental Monitoring for Radiological Safety in South East Asia, the Far East and the Pacific Regions - No.228; Estimation of Environmental Transfer of Plutonium and the Dose to Man - No.255), two were prepared for issue in that series (the proceedings of a workshop on fusion safety and a document on the monitoring and control measurement of carbon-14 in nuclear facilities) and one is being

prepared for issue (a document on assessing the intake of radioactive materials through food chains, including water).

D.1.2/4. One symposium and four seminars included the subject "Radiological protection of the general public" as a substantial part of their programmes.

D.1.2/5. An intercalibration study on water and sediment samples containing known amounts of fission products was carried out under a CRP on the radioecology of the Danube catchment area completed in 1982. A similar programme on the Baltic Sea was started in 1981 (Table D.8, No.3). Also in 1981, a CRP on carbon-14 from nuclear facilities was initiated in collaboration with the "Nuclear Fuel Cycle" programme (Table D.8, No.4).

Plans for 1983-84

D.1.2/6. In 1983, the environmental safety aspects of fusion power will be examined with a view to establishing a better data base for fusion safety work (Table D.9, No.8). Reports on three CRPs (D.1.2/5) will be produced (Table D.9, Nos 9-11).

D.1.2/7. In 1984, work - initiated in 1983 - on developing a methodology for the assessment of population doses from the nuclear fuel cycle will continue (Table D.9, No.12) and a study will be made - in relation to the release into the environment of radioactive materials that could have affects across international boundaries - of the monetary value placed on the man-Sievert (a unit of the quantity of radiation dose accumulated by a group of individuals) (Table D.9, No.13). Also in 1984, up-to-date information on doses to the public (and workers) from incorporated radioactive material will be reviewed at a symposium (Annex II(7) and Table D.9, No.7).

D.1.2/8. Summary reports from Member States on current research will be issued in Health Physics Research Abstracts.

D.1.2/9. A CRP on tritium permeation barriers for minimizing releases of tritium from fusion facilities to the environment will be initiated in 1983.

D.1.2/10. The need to update Safety Series No.18 (Environmental Monitoring in Emergency Situations) in the light of experience since the Three Mile Island incident will be assessed with the aid of a consultant.

D.1.2/11. The environmental and safety aspects of waste storage and disposal will be examined when necessary in support of the "Waste management" sub-programme of the "Nuclear Fuel Cycle" programme.

Related activities

D.1.2/12. In 1981, support was provided for 11 technical co-operation projects. A technical co-operation mission to Niger and six training courses for which lecturers were provided (D.1.1/11) dealt with environmental protection questions as well as the radiological protection of workers. A moderate increase in the scale of such activities is expected.

D.1.2/13. Health and safety inspection missions organized in collaboration with the "Safety of nuclear installations" sub-programme and component D.1.1 will continue in connection with Agency-sponsored research reactor projects.

New developments foreseen for 1985-88

D.1.2/14. As further developing countries enter the nuclear power field, additional emphasis will be placed on meeting requests for advisory missions designed to ensure that adequate radiological and environmental safety measures are being taken.

Co-operation with other organizations

D.1.2/15. Co-operation will be maintained with ICRP, UNSCEAR, WHO, FAO, UNEP, NEA, CMEA and ECE.

Safe transport of radioactive materials (component D.1.3)

Objective

D.1.3/1. The objective is to provide adequate and compatible safety standards which can be used as a basis for national and international regulations for the transport of radioactive materials, to advise and assist Member States and international organizations in connection with the effective application of such regulations, and to further public acceptance of the adequacy of the standards.

Results to date

D.1.3/2. The safe transport programme was expanded in 1978, primarily to assist Member States and international organizations in applying the basic Regulations for the Safe Transport of Radioactive Materials (Safety Series No.6), a comprehensive review of which was initiated in 1979. The Standing Advisory Group on the Safe Transport of Radioactive Materials (SAGSTRAM) concluded in 1981 that the work being done on transport risk assessment, transport safety research co-ordination and transport data collection and analysis was useful but that priority should be given to ensuring that the next (1984) revised edition of the Regulations remains valid for an extended period.

D.1.3/3. A revised edition of the document "Advisory Material for the Application of the IAEA Transport Regulations" (Safety Series No.37) has been prepared for publication in 1982. Documents are being prepared on quality assurance and compliance assurance; shipment data by type of container and mode of travel; and transport package test facilities.

D.1.3/4. Problems such as the thermal effects associated with packaged radioactive materials and the monitoring of packages containing such materials are being examined under a CRP initiated in 1980 (Table D.8, No.5).

D.1.3/5. The details of a methodology for assessing transport risks (developed in Sweden and the United States with input from a number of other countries) have been made available by the Agency to all Member States, which are being encouraged to assess the transport risks within their own borders, with a view to a worldwide assessment of transport risks by the Agency.

Plans for 1983-84

D.1.3/6. The comprehensive review of the Regulations will be completed with the help of an Advisory Group and SAGSTRAM (Table D.9, No.14) and the new edition will, subject to approval by the Board of Governors, be published in 1984; it is expected that this edition will be valid for at least ten years. In addition, SAGSTRAM will again review the Agency's transport safety activities as a whole.

D.1.3/7. Following publication of the new (1984) edition of the Regulations, a review will be carried out of the new (1982) edition of Safety Series No.37 (Advisory Material for the Application of the IAEA Transport Regulations) (Table D.9, No.15). Work - initiated in 1982 - will continue on the preparation of a companion document on the background of the Regulations, explaining the principles involved and the concepts and radiological protection models employed in formulating them (Table D.9, No.16).

D.1.3/8. A report will be made on research carried out under the CRP on safe transport (Table D.8, No.5 and Table D.9, No.17).

D.1.3/9. The transport of exempt shipments of radioactive materials by post will be examined in 1983 at a seminar bringing postal and transport authority representatives together with radiological protection experts (Annex I(7) and Table D.9, No.18).

D.1.3/10. The annual updating of the list of Member States' authorities competent in the field of safe transport of radioactive materials will

continue, as will the periodic issue of a report on transport packages approved and certified by the competent authorities in Member States.

Related activities

D.1.3/11. Agency staff will continue to attend selected international meetings in order to try to harmonize and unify the provisions for the consignment of radioactive materials by all modes of transport. It is planned to hold training courses on safe transport similar to one being held in the United Kingdom during 1982.

New developments foreseen for 1985-88

D.1.3/12. Emphasis will be placed on assisting Member States to formulate and implement programmes for achieving adequate compliance with the Agency's Transport Regulations.

Co-operation with other organizations

D.1.3/13. Co-operation will be maintained with ICRP, WHO, ISO, ICAO, IMCO, ECE, IATA, NEA, the Central Office for International Railway Traffic and the International Cargo Handling Co-ordination Association.

Emergency preparedness in support of nuclear facilities (component D.1.4)

Objective

D.1.4/1. The objective is to help Member States in developing, improving and evaluating their emergency planning and preparedness programmes (including their accident-handling capabilities) and to increase the Agency's ability to assist in co-ordinating the rendering, on request, of additional emergency assistance to a Member State that experiences a nuclear accident.

Results to date

D.1.4/2. Since 1959, the Agency has had a system for helping requesting Member States to obtain any additional assistance they may require for dealing with the consequences of radiation accidents; this system can be activated by implementing the Agency's "Radiation Emergency Assistance Plan". The Agency has had two requests (both in 1973) for help in arranging for the treatment of radiologically exposed persons since inception of the Plan, which is tested at intervals of approximately six months.

D.1.4/3. In 1980, a document entitled "Mutual Emergency Assistance for Radiation Accidents" (IAEA-TECDOC 237) was distributed to all Member States. Prepared by the Agency in collaboration with WHO, FAO, ILO and UNDRO, this document outlines the emergency assistance that Member States might be willing to make available on request or might require in the event of a radiation accident. The Agency is prepared to act, on request, as an intermediary between Member States in obtaining emergency resources and to send staff members to the site of an accident in order to assist the Member State in determining emergency resource needs.

D.1.4/4. The Agency is continuing to encourage Member States to enter into bilateral or multilateral agreements for the mutual provision of emergency assistance with or without the Agency's participation.

D.1.4/5. Recommendations calling for the formulation of additional technical guidance, the organization of training programmes and special assistance missions, and the updating and expansion of the Radiation Emergency Assistance Plan were made in 1980 and are now being put into effect.

D.1.4/6. A number of guidance documents have been issued concerning on-site and off-site emergency planning and preparedness at nuclear facilities and the handling of accidents that might involve radiation exposure of the public; for example, "Planning for Off-Site Response to Radiation Accidents in Nuclear Facilities" (Safety Series No.55) was published in 1981. A document entitled

"Emergency Response Planning for Transport Accidents Involving Radioactive Materials", prepared in collaboration with the "Safe transport of radioactive materials" component, is being issued during 1982. Work is nearing completion on two new Safety Series documents, one containing scenarios for the testing of emergency plans and the other on assessing the off-site consequences of accidents at nuclear facilities.

Plans for 1983-84

D.1.4/7. The Agency's Radiation Emergency Assistance Plan will be revised and expanded into a comprehensive "Nuclear Accident Assistance Plan" (Table D.9, No.19), which will - inter alia - provide for greater assistance through experts from outside the Agency.

D.1.4/8. The long-term remedial measures required in order to rehabilitate a contaminated environment following a nuclear accident will be examined (Table D.9, No.20).

D.1.4/9. Guidelines intended to promote a free exchange of information on nuclear facility operating experience, under both normal and abnormal conditions, among nuclear centres and neighbouring authorities (including authorities in different countries) will be formulated (Table D.9, No.21).

Related activities

D.1.4/10. Emergency planning and preparedness missions visited Brazil and Yugoslavia in 1981. Such missions will continue to be arranged at the request of Member States.

D.1.4/11. The first of a series of annual training courses on radiological emergency planning, preparedness and response, established to assist developing countries with nuclear power plants either operating or under construction, was held in the United States in February 1982. A regional seminar on the medical and health physics aspects of emergency preparedness conducted in South East Asia in 1981 is being followed by a similar seminar in the Mediterranean and Middle East region in 1982.

D.1.4/12. The Agency and other organizations concerned with nuclear manpower development will arrange a limited number of opportunities for personnel from Member States to obtain, after completion of a training course in emergency planning and preparedness, practical experience through special fellowships of three to six months oriented towards radiological emergencies at nuclear power plants.

New developments foreseen for 1985-88

D.1.4/13. Emphasis will be placed on help in developing and improving the emergency preparedness programmes of Member States.

Co-operation with other organizations

D.1.4/14. Co-operation will be maintained with UNDRO, ILO, WHO, FAO, ECE, NEA, CMEA, IIASA and the Institute of Nuclear Power Operations.

Physical protection of nuclear material (component D.1.5)

Objective

D.1.5/1. The objective is to provide advice and guidance on the physical protection of nuclear material in use, transit and storage.

Results to date

D.1.5/2. By the end of 1981, the Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev.1) had been signed by 32 States and EURATOM and ratified by three States. Work on a document entitled "Design Considerations for Physical Systems Applicable to Nuclear Facilities with

Particular Reference to Light Water Reactor Plants" is being completed in 1982. A fourth international training course on the physical protection of nuclear material and facilities was held in the United States early in 1982.

D.1.5/3. As the Agency's activities in the field of physical protection are becoming more technical, responsibility for co-ordinating them is being transferred from the "Legal services" sub-programme of the "Administration" programme to the "Radiological safety" sub-programme with effect from the beginning of 1983.

Plans for 1983-84

D.1.5/4. Revision of document INFCIRC/225/Rev.1, "The Physical Protection of Nuclear Material", will be initiated with a view to updating recommendations and explanations as to what can be done by Member States to establish - or to improve the quality and effectiveness of - national systems for the physical protection of nuclear facilities and material (Table D.9, No.22). The development of guidance on physical protection design for the international transport of nuclear material will be initiated (Table D.9, No.23). A list of authorities responsible for emergency response action related to the theft or misuse of nuclear material will be compiled.

D.1.5/5. Guidance and assistance will be provided to Member States on request and training courses will be organized.

Related activities

D.1.5/6. Close co-operation in the execution of these activities will be maintained with the "Legal services" sub-programme and the "Safeguards" programme.

SUB-PROGRAMME D.2

Safety of nuclear installations

OBJECTIVE

D.2/1. The objective is to give Member States up-to-date advice and assistance (through the establishment of a coherent and comprehensive set of internationally acceptable safety codes and guides for thermal-neutron nuclear power plants and for other nuclear facilities, safety advisory services, the exchange of information and the provision of training) in connection with the regulation, siting, design, construction and operation of research reactors, nuclear power plants and other nuclear facilities.

PROGRAMME TRENDS FOR 1983-84

D.2/2. In 1974, the Agency initiated a programme to develop internationally agreed safety standards for nuclear power plants. Preparation of the basic documents in the Nuclear Safety Standards (NUSS) programme is now at an advanced stage and will be nearing completion by the end of 1984. The effort to encourage and assist Member States in the use of these documents will be reinforced. Seminars and training courses will be organized to present and clarify their content and special advisory missions will be sent to Member States to assist in their implementation. In addition, meetings will be organized among the users of the documents to discuss practical difficulties in their application.

D.2/3. Work will continue on the preparation of safety codes, guides and manuals for research reactors. As the work under the NUSS programme is completed, the development of codes and guides for advanced power plants and nuclear fuel cycle facilities will commence.

D.2/4. Advisory services (mainly in the form of safety missions) and training courses primarily directed towards developing countries which are embarking on or planning nuclear power programmes will continue. These will deal with definite technical issues of concern to utilities and regulatory bodies. Other safety services will involve making available to Member States the Agency's safety-related computer programs and data bank.

D.2/5. During the past few years, there has been a call by many Governments for the Agency to act as a focal point for the worldwide collection, analysis and dissemination of information concerning abnormal operating occurrences so that this information can be rapidly fed back to regulators, designers and operators. A guidebook with recommendations to all Member States on suitable systems for collecting and reviewing information concerning safety-related events will be published. This is an important step towards the harmonization of national systems and the eventual development of an international system.

D.2/6. In nuclear safety research there are great potential advantages to be derived from international co-operation. Regular discussions will continue to be held on the main objectives of national research programmes and the results they produce. Topics of particular interest, such as containment integrity, early failure diagnosis and fuel behaviour under accident conditions, will be considered at specialist group meetings.

D.2/7. A report on nuclear power plant safety and the measures being undertaken to improve it will be submitted to the Board of Governors each year. The information in the report will be obtained from discussions with experts in industry, regulatory agencies, national research laboratories and international organizations, and from a review of relevant documents.

Safety of nuclear installations

Summary by programme components

Table D.5

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Nuclear safety standards for thermal-neutron nuclear power plants	5.0	2.0	422 800	276 000	-	69 200	768 000
Nuclear safety standards for research reactors, advanced nuclear power plants and fuel cycle facilities	0.6	0.3	50 400	-	-	4 600	55 000
Advisory services on the safety of nuclear power plants, research reactors and other nuclear facilities	3.4	1.7	284 700	-	-	44 300	329 000
Exchange of information and training	3.4	1.0	256 000	113 000	-	4 000	373 000
Nuclear reactor safety research and development	1.0	0.7	83 100	27 000	5 000	2 900	118 000
Linguistic services	-	-	-	-	-	253 000	253 000
Printing and publishing services	-	-	-	-	-	278 000	278 000
Data processing services	-	-	-	-	-	62 000	62 000
Conference and contracts services	-	-	-	-	-	40 000	40 000
TOTAL	13.4	5.7	1 097 000	416 000	5 000	758 000	2 276 000

Nuclear safety standards for thermal-neutron nuclear power plants (component D.2.1)

Objective

D.2.1/1. The objectives are:

(a) to prepare an internationally agreed set of recommendations (in the form of codes, guides and manuals) on the safety of thermal-neutron power plants;

(b) to review such codes, guides and manuals so as to take into account progress in technology and the experience gained in using them; and

(c) to promote the use of the Agency's safety codes and guides in national regulations and international standards.

Results to date

D.2.1/2. Five codes of practice and 37 safety guides had been completed by the end of 1981. Of these, 31 have already been published in English, 26 in French, 23 in Russian and 19 in Spanish. The documents represent a co-ordinated and consistent set of codes and guides which express a comprehensive and internationally agreed approach to nuclear safety.

D.2.1/3. A considerable effort has been devoted to assisting Member States in using these documents, through special advisory missions, seminars and training courses. In the period 1978-81, seven missions were carried out on request to explain, clarify and discuss the application of the NUSS documents. In addition, three seminars were held on NUSS-related topics: the selection and implementation of safety standards; safety reviews and inspections; and the siting of nuclear power plants in developing countries. Technical support has been provided for 13 regional and interregional training courses attended by 400 participants.

Plans for 1983-84

D.2.1/4. All of the codes and guides in the areas of governmental organization and quality assurance will be completed and work will continue in the areas of siting, design and operation (Table D.9, Nos 24-33).

D.2.1/5. Increased emphasis will be placed on implementing the NUSS documents. This will entail:

(a) making them better known by using them in Agency activities and by reporting on them more widely in the literature (Table D.9, Nos 34 and 35);

(b) assisting Member States in the use of the documents through special missions and Agency training courses;

(c) holding discussions and reporting on users' experience with the documents (Table D.9, Nos 36-39);

(d) preparing users' manuals for the safety guides as needed;

(e) organizing a seminar on the management of nuclear power plants (Annex I (8) and Table D.9, No.40).

(f) organizing a symposium on the implementation of the codes of practice and safety guides (Annex II(8)).

Related activities

D.2.1/6. The Agency will send NUSS missions on request through technical co-operation projects. Interregional and regional training courses based predominantly on NUSS documents will be offered.

New developments foreseen for 1985-88

D.2.1/7. This period will see the completion of the development phase of the NUSS programme. The fact that the complete set of documents is available will promote their use by Member States and may encourage their application to nuclear safety problems which have multi-national aspects. Greater emphasis will be placed on implementation, with systematic revision of the documents as required by advances in technology and feedback from users.

Co-operation with other organizations

D.2.1/8. This component involves co-operation with NEA, CMEA, ISO, CEC, WMO, WHO and IEC.

Nuclear safety standards for research reactors, advanced nuclear power plants and fuel cycle facilities (component D.2.2)

Objective

D.2.2/1. The objective is to prepare and update safety codes, guides and manuals for research reactors, advanced reactors and nuclear fuel cycle facilities.

Results to date

D.2.2/2. Work has continued on the preparation of safety documents relating to core conversion of research reactors from highly enriched to low-enriched uranium. A consultants' group has prepared an updated version of Safety Series No.35, the Code of Practice for Safe Operation of Critical Assemblies and Research Reactors.

Plans for 1983-84

D.2.2/3. After receipt of comments from Member States, the revised Code of Practice for Safe Operation of Critical Assemblies and Research Reactors will be issued (Table D.9, No.41).

D.2.2/4. A Safety Series document on the decommissioning of research reactors will be prepared (Table D.9, No.42).

D.2.2/5. The safety standards programme will be extended to the preparation of codes and guides for nuclear fuel cycle facilities. Work will also start on safety standards for advanced nuclear power plants. This activity will grow as staff working on the NUSS programme become available, reaching full scale in the period after 1983.

New developments foreseen for 1985-88

D.2.2/6. During the past decade, work on the safety of research reactors has not kept pace with requirements, and it will be necessary for the Agency to increase its activities in this field. This is of particular importance since some thirty research reactors are covered by Agency project agreements. The preparation of codes and guides for nuclear fuel cycle facilities will continue and the preparation of codes and guides for fast reactors will be initiated.

Co-operation with other organizations

D.2.2/7. This component involves co-operation with NEA, CMEA, ISO, CEC, WMO, WHO and IEC.

Advisory services on the safety of nuclear power plants, research reactors and other nuclear facilities (component D.2.3)

Objective

D.2.3/1. The objective is to advise and assist Member States in connection with the safety aspects of nuclear power plants, research reactors and other nuclear facilities by organizing and co-ordinating the safety missions of Agency staff members and external experts after the study of safety-related reports.

Results to date

D.2.3/2. Safety assessments have been made of research reactors covered by Agency project agreements and of other reactors for which requests have been received from Member States.

D.2.3/3. Safety missions have been organized at the request of Member States. They have included reviews of the organization of regulatory bodies and assistance in the siting of nuclear plants and the assessment of specific safety aspects.

Plans for 1983-84

D.2.3/4. Safety advisory missions tailored to suit the requirements of Member States will continue to be organized. They will include missions to advise on governmental organization for countries embarking on nuclear power programmes, siting missions and missions on specific aspects of the safety evaluations of nuclear power plants, e.g. quality assurance and safety concerns resulting from the Three Mile Island accident.

D.2.3/5. Research reactors covered by Agency project agreements will be visited on a regular basis - about once every two years - to determine whether the safety conditions applicable to the project are as recommended in the relevant parts of the Agency's codes of practice. Now that there is a trend to replace highly enriched uranium by low-enriched uranium fuels in research reactors, missions will be needed to advise on the safety aspects of core conversions.

D.2.3/6. Computer programs frequently used in safety evaluations will be identified and made available to Member States. Experts from Member States will supply the input data for their safety-related problems and receive the output results following calculation at the Agency's computer centre.

D.2.3/7. A document on the lessons that can be drawn from the Three Mile Island incident will be issued for the benefit of developing countries (Table D.9, No.43).

Co-operation with other organizations

D.2.3/8. This component involves co-operation with WHO and WMO.

Exchange of information and training (component D.2.4)

Objective

D.2.4/1. The objective is to assist Member States in the introduction of nuclear power through regional and interregional training courses on nuclear facility licensing and regulation and through seminars and symposia relating to the safety of nuclear power plants and to the implementation of the safety codes and guides.

Results to date

D.2.4/2. In addition to the activities described in D.2.1/3, staff members have lectured at the nuclear power training courses at the Kernforschungszentrum Karlsruhe (Federal Republic of Germany), at Argonne National Laboratory (United States) and at the Centre d'études nucléaires de Saclay (France) on general subjects related to safety.

D.2.4/3. A seminar on the safety of two-loop pressurized water reactors was held in 1981.

D.2.4/4. A major international conference on nuclear power safety issues was held in Stockholm (Sweden) in 1980 to assess and clarify the status and development of safety issues, to provide a forum for a world-wide exchange of safety information and to discuss means of further improving safety.

D.2.4/5. The Agency has been requested to act as a focal point for the worldwide collection, analysis and dissemination of information concerning significant abnormal operating experience so that it can be fed back to regulators, designers and operators.

Plans for 1983-84

D.2.4/6. A symposium on the operational safety of nuclear power plants will be held in 1983 (Annex I (9) and Table D.9, No.44) and a seminar in 1984 on the diagnosis of and response to abnormal occurrences (Annex II(9)).

D.2.4/7. A programme for the utilisation of experience from abnormal occurrences in nuclear power plants will be established. This will comprise the preparation of a guide for Member States on national systems for collecting, evaluating and disseminating information on abnormal occurrences and the development of arrangements to be made by the Agency to collect information on abnormal events of interest to the international community, to evaluate this information and to disseminate the conclusion drawn from it (Table D.9, Nos 45 and 46).

D.2.4/8. Specific safety topics which may require consideration as a result of new experiences or new developments will be selected and reviewed. Topics already selected are: fission product behaviour following a major accidental release and the quantifying of safety goals (Table D.9, Nos 47-50).

Related activities

D.2.4/9. Lectures will be given for technical co-operation training courses.

Co-operation with other organizations

D.2.4/10. This component involves co-operation with NEA, CEC, CMEA, ISO and IEC.

Nuclear reactor safety research and development (component D.2.5)

Objective

D.2.5/1. The objective is to keep abreast of the progress in nuclear safety research and development in Member States and to co-ordinate (in co-operation with other international organizations) nuclear safety research and development activities in Member States through liaison with national regulatory bodies in respect of on-going and planned safety research and of safety research facilities.

Results to date

D.2.5/2. Ways of improving the exchange of information and possibilities for co-ordination were discussed in 1981.

Plans for 1983-84

D.2.5/3. To meet the need for greater international co-operation in the area of safety research and development, annual reviews will be made (Table D.9, No.51). A working group will consider a specific aspect of safety research (Table D.9, No.52).

D.2.5/4. Consideration will be given to a proposal that the Agency collect, collate and disseminate reactor safety research information in the form of a safety research project index, as well as to other forms of information exchange, co-ordination and co-operation.

Co-operation with other organizations

D.2.5/5. This component involves co-operation with NEA, CEC and CMEA.

SUB-PROGRAMME D.3

Radiation protection service

OBJECTIVE

D.3/1. The objective is to provide adequate radiation protection services for the Agency's laboratories and for all persons for whose radiation protection the Agency is responsible and to control the radiological impact of the Agency's own operations on the general public and the environment.

Whenever feasible, other occupational safety aspects will be included in the advisory function of the radiation protection service.

PROGRAMME TRENDS FOR 1983-84

D.3/2. Emphasis will be placed on continued upgrading of the Agency's radiation protection services through development and improvement of the techniques necessary for providing an efficient and reliable monitoring and surveillance programme.

RESULTS TO DATE

D.3/3. Personnel monitoring services for external irradiation and bioassay and whole-body monitoring services for internal irradiation have been arranged for staff of the laboratories at Seibersdorf, Monaco and Headquarters, for safeguards inspectors and for other staff for whose radiation protection the Agency is responsible. Radiation surveillance has been provided on a continuous basis at Seibersdorf. Arrangements have been made to provide suitable medical care for staff members who might be involved in radiation accidents.

D.3/4. After a review of the safety analysis reports and alarm plans for SAL and for the dosimetry, medical applications and health physics laboratories at Seibersdorf (in the D & M Annex), the responsibility for operating SAL has been taken over by the Agency and authorization to operate the laboratories in the D & M Annex has been obtained.

D.3/5. In 1981, a thermoluminescent personnel monitoring system was installed in the health physics laboratory at Headquarters and a microcomputer for radiation protection purposes in the health physics laboratory at Seibersdorf.

D.3/6. The working conditions of about 150 technical co-operation projects were analysed during 1981; radiation protection services for such projects have been provided, where necessary, since September 1981.

D.3/7. Training has been provided for the Agency's radiation workers and for personnel from Member States. An interregional training course on risk prevention in the use of radiation was held at Saclay, France, during 1981.

PLANS FOR 1983-84

D.3/8. Radiation protection services will continue to be provided for the staff of the laboratories at Seibersdorf, Monaco and Headquarters, for safeguards inspectors and other staff, and for technical co-operation experts who might be exposed to radiation in the course of their work.

D.3/9. The Agency's radiation protection rules and procedures will, with the assistance of experts from outside the Agency if necessary, be reviewed and appropriate recommendations will be submitted to the inter-departmental Radiation Protection Committee in order to ensure the incorporation of current principles and the latest technology.

D.3/10. The staff of the Agency's laboratories, safeguards inspectors and - to the extent possible - technical co-operation experts will receive training that covers radiation protection conditions relevant to their duties. It is expected that the number of fellowships for training at the Agency's laboratories and of interregional training courses on radiation protection will increase.

RELATED ACTIVITIES

D.3/11. There will continue to be co-operation between the Radiation Protection Service, the Joint Medical Service and the Agency's laboratories in ensuring the protection of occupationally exposed staff.

D.3/12. Radiation protection services, based on better techniques and equipment, will continue to be provided for technical co-operation projects.

D.3/13. The Radiation Protection Service will increase its support of the "Safeguards" programme through the provision of improved radiation protection kits for inspectors.

Radiation protection service

Summary by programme component

Table D.6

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Radiation protection service	3.1	5.3	348 000	-	-	52 000	400 000
Printing and publishing services	-	-	-	-	-	2 000	2 000
TOTAL	3.1	5.3	348 000	-	-	54 000	402 000

SUB-PROGRAMME D.4

Risk assessment

OBJECTIVE

D.4/1. The objective is: to assess and evaluate the risks and benefits of nuclear power in comparison with other energy systems; to identify major factors (including human factors) contributing to the risks of nuclear power and measures that could improve nuclear safety; and to determine acceptable levels of risk and the factors that influence societal preferences regarding the risks of energy systems.

PROGRAMME TRENDS FOR 1983-84

D.4/2. In several developed and developing countries, public acceptance has become important for the future role of nuclear power in the total energy scheme. An understanding of the nuclear controversy, the determination of acceptable levels of risk and an assessment of the risks and benefits of nuclear power in comparison with other energy systems are necessary in order to set acceptable safety goals and to increase acceptance of nuclear power.

D.4/3. Agency personnel are being augmented by scientists seconded cost-free by interested Member States (so far nine Member States have made such secondments) and may also be augmented by IIASA staff. The results of their work are being reported at scientific conferences, in professional journals and in Agency and IIASA publications.

D.4/4. The Agency will continue to assist Member States in using the methodologies developed under this sub-programme, the emphasis being on the documentation of techniques so that they are readily available for use by Member States and on the practical application of techniques and computer codes in case studies of direct interest to Member States.

D.4/5. Work will be extended to include human factors engineering in relation to probabilistic risk assessment and the establishment of quantitative safety goals; human factors engineering has the potential capability of significantly reducing human error in plant operation and thus of increasing reactor safety.

Risk assessment

Summary by programme components

Table D.7

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Risks and benefits of energy systems	0.4	1.6	95 200	-	15 000	2 800	113 000
Risk analysis and evaluation	0.4	1.1	81 100	-	22 000	1 900	105 000
Public attitudes towards nuclear power	0.4	1.6	90 800	-	3 000	4 200	98 000
Linguistic services	-	-	-	-	-	4 000	4 000
Printing and publishing services	-	-	-	-	-	7 000	7 000
Data processing services	-	-	-	-	-	15 000	15 000
Conference and contracts services	-	-	-	-	-	3 000	3 000
TOTAL	1.2	4.3	267 100	-	40 000	37 900	345 000

Risks and benefits of energy systems (component D.4.1)

Objective

D.4.1/1. The objective is to collect and evaluate information on the risks, costs and benefits of energy systems in order to facilitate the assessment by Member States of the real potential of nuclear power in the energy scheme of industrialized and developing regions, and to make this information available to administrators and decision-makers at the national and international level, to the scientific community and to the general public.

Results to date

D.4.1/2. A comparative study of the risks - over the total fuel cycle - of large-scale, centralized electricity production through nuclear power, coal, oil, natural gas and solar systems has been completed and the results published widely and presented at various international conferences; a document summarizing the data base is being issued in 1982. This study forms the basis for an Agency booklet entitled "Energy Options - The Risks and Benefits Involved" that is in preparation and will be addressed to the general public. Some risks, such as those related to the long-lived isotopes emitted from the nuclear fuel cycle and to the CO_2 emissions from fossil fuel consumption, have not been covered in this study; they will be analysed separately.

D.4.1/3. Since the CO_2 problem may become one of the most important factors determining the role of nuclear power, a computer code that calculates atmospheric CO_2 and carbon-14 concentrations for various global energy scenarios has been developed.

D.4.1/4. Work has started (in co-operation with IIASA) on the collection of data relating to the risks of nuclear power and other energy systems, the aim being to include consideration of energy system risks in the models used for constructing IIASA's "high" and "low" energy scenarios and to analyse their implications for the future role of nuclear power (especially in developing regions).

Plans for 1983-84

D.4.1/5. The comparative study of risks will be extended to cover further energy systems and pollutants of global as well as regional or local impact. Emphasis will be placed on reducing the uncertainties involved in estimating the risks from total energy scenarios and on considering risks not yet included, the main problem areas being the "back-end" of the fuel cycle, the construction and dismantling of facilities and public health effects.

Related activities

D.4.1/6. Assistance in designing and conducting comparative risk studies will be provided to Member States on request. In 1981, expert services and fellowship training were provided.

New developments foreseen for 1985-88

D.4.1/7. It is planned to use the methodologies developed and results obtained at the global or regional level for country-specific studies carried out at the request of Member States.

Co-operation with other organizations

D.4.1/8. The comparative study is being carried out in co-operation with IIASA (three countries are co-operating through the secondment of cost-free experts and several other countries in other ways). The results of the study will be used by UNEP in its efforts to promote cost-benefit analyses of energy systems.

Risk analysis and evaluation (component D.4.2)

Objective

D.4.2/1. The objective is to quantify the factors that determine risks and to develop safety criteria and quantitative safety goals.

Results to date

D.4.2/2. With the help of economic input/output methodology, a computer code that calculates the risks from production of safety equipment has been developed and is being used in a study in which costs are being determined for risk reduction beyond the point where no further increase in safety is achievable.

D.4.2/3. Several factors that influence the perception of risks have been identified and a study has been made of the trade-off between high-probability/low-consequence and low-probability/high-consequence accidents.

Plans for 1983-84

D.4.2/4. Subject to the availability of seconded staff, work will continue on the problem of defining risks and acceptable levels of risk. There will be an expansion of work on the probability distribution of risks within the population affected, on the trade-off between long-term and short-term risks and on how to include the uncertainties of estimates in quantitative safety goals; in the light of recommendations made in 1982 by a group of consultants, this work may be extended to cover human factors engineering (Table D.9, No.53).

D.4.2/5. A study on the cost-effectiveness of risk reduction in energy systems will be performed in order to determine the optimum allocation of resources to be spent on safety (Table D.9, No.54).

Related activities

D.4.2/6. On request from Member States, assistance in the planning and conduct of studies will be provided either through fellowships or expert services or within the framework of research contracts; so far three countries (Austria, France and the Philippines) have requested such assistance.

New developments foreseen for 1985-88

D.4.2/7. Emphasis will be placed on investigating the application of the methods developed and of the results obtained in formulating criteria for developing safety standards.

Public attitudes towards nuclear power (component D.4.3)

Objective

D.4.3/1. The objective is to assist Member States in analysing issues connected with nuclear power and other energy systems and to obtain a reliable picture of the nuclear controversy (a prerequisite for effective public information activities).

Results to date

D.4.3/2. On the basis of a psychometric model, a questionnaire designed to permit a detailed analysis of the belief structure underlying public attitudes has been developed for application to the general public in Member States. Sample responses have been obtained from Austria, Brazil, France, the Federal Republic of Germany, Japan and the Philippines. The analysis of data is being performed in co-operation with a number of Member States, scientists from which are being trained in the use of the methodology.

D.4.3/3. The results of opinion polls about nuclear power in Member States are being collected in order to obtain a world-wide picture of trends in the acceptance of nuclear power.

Plans for 1983-84

D.4.3/4. The Agency's collection of opinion poll results will be regularly updated and analysed statistically in order - where possible - to relate changes in trends to specific causes. On request, the Agency will continue to assist Member States in using the methodology for analysing the structure of public attitudes and in the analysis and interpretation of data.

Co-operation with other organizations

D.4.3/5. Co-operation with atomic energy commissions, university institutes and other bodies in Member States will continue.

Co-ordinated research programmes

Table D.8

Co-ordinated programme title	Number of Contracts	Number of Agreements	Year initiated	Probable year of completion
1. Use of chromosomal aberration analysis in the radiation protection of occupationally exposed workers	This programme has been approved but no contracts have yet been awarded		1981	1985
2. Lung monitoring for the intake of plutonium	This programme has been approved but no contracts have yet been awarded		1982	1986
3. Study of radioactive materials in the Baltic Sea	2	5	1981	1985
4. Carbon-14 from nuclear facilities	1	2	1981	1985
5. Safe transport of radioactive materials	2	8	1980	1983

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table D.9

No.	Document	Users	Source	Year of issue	Paragraph
1.	Safety Series, manual on control measures for limiting radiation exposures in the mining and milling of radioactive ores	Operators of mines and mills; health physicists; competent authorities	Consultants AG 84/1	1986	D.1.1/8(a)
2.	Revision of Safety Series No.43, Manual on Radiological Safety in Uranium and Thorium Mines and Mills	As above	Consultants AG 84/2	1985	D.1.1/8(b)
3.	Revision of Technical Reports Series No.142, Inhalation Risks from Radioactive Contaminants	Operators of nuclear facilities; health physicists; competent authorities	Consultants AG 84/3	1985	D.1.1/8(c)
4.	IAEA-TECDOC on occupational radiation exposure trends in the nuclear fuel cycle	As above	AG 84/4	1985	D.1.1/8(d)
5.	Technical Report on nuclear accident dosimetry	Health physicists	TC 83/1	1984	D.1.1/9
6.	IAEA-TECDOC on radiation protection in the mining and milling of radioactive ores	Operators of mines and and mills; health physicists; competent authorities	Seminar in 1983	1984	D.1.1/10

Table D.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
7.	Proceedings of symposium on the assessment of radioactive contamination in man	Health physicists, physicians; competent authorities	Symposium in 1984	1985	D.1.1/10 and D.1.2/7
8.	IAEA-TECDOC on fusion reactor safety	Health physicists	TC 83/2	1983	D.1.2/6
9.	IAEA-TECDOC on the radioecology of the Danube catchment area	Authorities in Danube riparian countries; environmental protection specialists	CRP	1984	D.1.2/6
10.	IAEA-TECDOC on radioactive materials in the Baltic Sea	Authorities in countries of the Baltic region	CRP TC 83/3	1983	D.1.2/6
11.	IAEA-TECDOC on carbon-14 from nuclear facilities	Health physicists; competent authorities	CRP	1984	D.1.2/6
12.	Safety Series, document on a methodology for assessing population doses from the nuclear fuel cycle	Operators of nuclear facilities; health physicists; competent authorities	Consultants AG 84/5	1985	D.1.2/7
13.	Safety Series, document on the monetary value of the man-Sievert	As above	Consultants AG 84/6	1986	D.1.2/7
14.	Revision of Safety Series No.6, Regulations for the Safe Transport of Radioactive Materials	Competent authorities; international transport organizations, shippers and carriers; package designers	AG 83/4 TC 83/5	1984	D.1.3/6
15.	Revision of Safety Series No.37, Advisory Material for the Application of the IAEA Transport Regulations	As above	Consultants AG 84/7	1984	D.1.3/7
16.	Safety Series, document with explanatory material on the background of the Transport Regulations	As above	Consultants TC 83/6	1984	D.1.3/7
17.	IAEA-TECDOC on research relating to the safe transport of radioactive materials	Competent authorities; package designers; health physicists	CRP	1983	D.1.3/8
18.	Proceedings of seminar on exempt shipments of radioactive material transported by post	Postal authorities and other carriers; regulatory authorities; shippers	Seminar in 1983	1984	D.1.3/9
19.	Safety Series, IAEA Nuclear Accident Assistance Plan (NAAP)	Secretariat and Member States	Consultants	1984	D.1.4/7

Table D.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
20.	Safety Series, document on post-accident assessment and recovery in a radiation environment	Competent authorities; nuclear facility operators	Consultants AG 83/7 AG 84/8	1985	D.1.4/8
21.	IAEA-TECDOC with guidelines for the exchange of information on nuclear facility operating experience	As above	Consultants AG 84/9	1985	D.1.4/9
22.	Revision of INFCIRC/225/Rev.1 ("The Physical Protection of Nuclear Material")	Competent authorities; nuclear facility operators; shippers and carriers	Consultants AG 83/8	1984	D.1.5/4
23.	IAEA-TECDOC with guidance on design for the physical protection of nuclear material during international transport	Competent authorities; shippers and carriers	Consultants	1984	D.1.5/4
24.	Safety Guide SG-D9, Design Aspects of Radiological Protection for Operational States of Nuclear Power Plants	Regulatory bodies; utilities; designers and constructors of nuclear power plants	Consultants, TRCs and SAGs 83/9-22 84/10-20 (as required)	1984	D.2.1/4
25.	Safety Guide SG-D10, Fuel Handling and Storage Systems in Nuclear Power Plants	As above	As above	1984	D.2.1/4
26.	Safety Guide SG-G9, Establishment and Purpose of Regulations and Guides	As above	As above	1983	D.2.1/4
27.	Safety Guide SG-O11, Operational Management of Radioactive Effluents and Wastes Arising in Nuclear Power Plants	As above	As above	1984	D.2.1/4
28.	Safety Guide SG-S7, Nuclear Power Plant Siting: Hydrogeological Aspects	As above	As above	1983	D.2.1/4
29.	Safety Guide SG-D8, Instrumentation and Control of Nuclear Power Plants	As above	As above	1983	D.2.1/4
30.	Safety Guide SG-O9, Management of Nuclear Power Plants for Safe Operation	As above	As above	1983	D.2.1/4
31.	Safety Guide SG-O10, Core Management, Fuel Handling and Associated Services for Nuclear Power Plants	As above	As above	1983	D.2.1/4

Table D.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
32.	Safety Guide SG-QA1, Preparation of the Quality Assurance Programme for Nuclear Power Plants	As above	As above	1983	D.2.1/4
33.	Safety Guide SG-QA11, Quality Assurance in the Procurement, Design and Manufacture of Nuclear Fuel Assemblies	As above	As above	1983	D.2.1/4
34.	News about NUSS (newsletter)	As above		Annually	D.2.1/5(a)
35.	NUSS Brochure	As above		Annually	D.2.1/5(a)
36.	Recommendations on NUSS implementation (governmental organization)	As above	AG 83/23	1983	D.2.1/5(c)
37.	Recommendations on NUSS implementation (quality assurance)	As above	AG 83/24	1983	D.2.1/5(c)
38.	Recommendations on NUSS implementation (siting)	As above	AG 84/21	1984	D.2.1/5(c)
39.	Recommendations on NUSS implementation (operation)	As above	AG 84/22	1984	D.2.1/5(c)
40.	IAEA-TECDOC: summary of seminar on power plant management	Nuclear power plant operators	Seminar in 1983	1983	D.2.1/5(e)
41.	Revision of Safety Series, Code of Practice for Safe Operation of Critical Assemblies and Research Reactors	Regulatory bodies; operators, designers and constructors of research reactors		1983	D.2.2/3
42.	Safety Series document on the decommissioning of research reactors	As above	TC 84/23	1985	D.2.2/4
43.	IAEA-TECDOC on lessons to be drawn from the Three Mile Island incident	Regulatory bodies; utilities; designers and constructors of nuclear power plants	Consultants	1983	D.2.3/7
44.	Proceedings of symposium on the operational safety of nuclear power plants	As above	Symposium in 1983	1984	D.2.4/6
45.	Guide on national systems for the collection, evaluation and dissemination of information on safety-related unusual events in nuclear power plants	As above		1983	D.2.4/7

Table D.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
46.	Reviews and analysis of abnormal occurrences in power reactors in Member States	As above	TC 83/25 and 84/24	Annually	D.2.4/7
47.	Reports on selection of safety-related topics	As above	AG 83/26 and 84/25	1983 1984	D.2.4/8
48.	Report on fission product releases from water reactors following a severe accident	As above	TC 83/27	1983	D.2.4/8
49.	Report on quantifying of safety goals	As above	TC 83/28	1983	D.2.4/8
50.	Reports on safety topics to be selected in 1984	As above	TC 84/26-27	1984	D.2.4/8
51.	Review of nuclear safety research results	As above	TC 83/29 and 84/28	Annually	D.2.5/3
52.	Report of working group on safety research	As above	Working group 83/30 84/29	Annually	D.2.5/3
53.	IAEA-TECDOC on human factors engineering	Atomic Energy Commissions; regulatory bodies	Consultants	1983	D.4.2/4
54.	IAEA-TECDOC on the cost-effectiveness of risk reduction	As above	Research contracts	1984	D.4.2/5

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983		Paragraph
1.	Technical Committee on nuclear accident dosimetry	D.1.1/9
2.	Technical Committee on selected aspects of fusion reactor safety	D.1.2/6
3.	Technical Committee on levels of radioactive materials in the Baltic Sea	D.1.2/6
4.	Advisory Group on the Regulations for the Safe Transport of Radioactive Materials	D.1.3/6
5.	Standing Advisory Group on the Safe Transport of Radioactive Materials (SAGSTRAM)	D.1.3/6
6.	Technical Committee to formulate explanatory material on the background of the Agency's Transport Regulations	D.1.3/7
7.	Advisory Group on post-accident assessment and recovery in a radiation environment	D.1.4/8
8.	Advisory Group to revise INFCIRC/225/Rev.1 ("The Physical Protection of Nuclear Material")	D.1.5/4
9-22.	Three Senior Advisory Groups and eleven Technical Review Committees for the NUSS programme	D.2.1/4
23-24.	Advisory Groups on implementation of NUSS documents (NUSS document users)	D.2.1/5(c)
25.	Technical Committee on the review of abnormal occurrences in nuclear power plants	D.2.4/7
26.	Advisory Group on selection of safety topics	D.2.4/8
27.	Technical Committee on fission product releases from water reactors following a severe accident	D.2.4/8
28.	Technical Committee on quantifying of safety goals	D.2.4/8
29.	Technical Committee on nuclear safety research results	D.2.5/3
30.	International Working Group on safety research	D.2.5/3

1984		Paragraph
1.	Advisory Group on control measures for limiting radiation exposures in the mining and milling of radioactive ores	D.1.1/8(a)
2.	Advisory Group on radiological safety in uranium and thorium mines and mills	D.1.1/8(b)
3.	Advisory Group on inhalation risks from radioactive contaminants	D.1.1/8(c)
4.	Advisory Group on occupational radiation exposure trends in nuclear fuel cycle facilities	D.1.1/8(d)
5.	Advisory Group on the assessment of population doses from the nuclear fuel cycle	D.1.2/7
6.	Advisory Group on the monetary value of the man-Sievert	D.1.2/7
7.	Advisory Group on applying the Agency's Transport Regulations	D.1.3/7
8.	Advisory Group on post-accident assessment and recovery in a radiation environment	D.1.4/8
9.	Advisory Group on the exchange of technical information among nuclear centres and neighbouring authorities on nuclear facility operating experience	D.1.4/9
10-20.	Three Senior Advisory Groups and eight Technical Review Committees for the NUSS programme	D.2.1/4
21-22.	Advisory Groups on implementation of NUSS documents (NUSS document users)	D.2.1/5(c)
23.	Technical Committee on the decommissioning of research reactors	D.2.2/4
24.	Technical Committee on the review of abnormal occurrences in nuclear power plants	D.2.4/7
25.	Advisory Group on selection of safety topics	D.2.4/8
26-27.	Technical Committees on selected safety topics	D.2.4/8
28.	Technical Committee on nuclear safety research results	D.2.5/3
29.	International Working Group on safety research	D.2.5/3

E. NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table E.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	26 297
Sub-total	26 297
Common staff costs	9 393
Travel	-
Meetings	
Technical committees, advisory groups	-
Representation and hospitality	-
Transfer of costs:	
Translation and records services	-
Printing and publishing services	32 183
Other services	81 000
Conference and contracts services	-
TOTAL	148 873

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
4 000	-	-	-	4 000	4 000	4 000
4 000	-	-	-	4 000	4 000	4 000
1 000	700	-	700	1 700	1 700	1 700
-	-	1 300	1 300	1 300	1 000	1 000
-	-	-	-	-	22 000	22 000
-	-	-	-	-	300	300
4 000	-	-	-	4 000	6 000	6 000
3 000	-	(1 000)	(1 000)	2 000	2 000	30 000
-	-	-	-	-	-	-
-	-	-	-	-	1 000	1 000
12 000	700	300	1 000	13 000	38 000	66 000

SUMMARY OF MANPOWER

Table E.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
P-5	1	-	-	-	-	-	-

CHANGES IN COSTS

E/1. As will be seen from Table E.1 above, the cost of this programme is expected to increase by $1000, of which $700 will be required to cover price increases and $300 is a programme increase. The programme increase of $300 is the net result of the addition of $1300 for travel, which was not foreseen in 1982, and a programme decrease of $1000 in respect of printing and publishing services.

THE PROGRAMME

OBJECTIVE

E/2. The objective is to promote the exchange of information on nuclear explosions for peaceful purposes, to develop procedures for their use, to study the economic, legal, health, safety and environmental aspects involved and to respond to requests for PNE-related services.

RESULTS TO DATE

E/3. The activities constituting this programme were initiated in 1967. The Unit for Peaceful Nuclear Explosions Services was established in 1975.

E/4. Since 1978, the proceedings of one technical meeting on the phenomenology and practical aspects of PNEs have been issued in the Agency's Proceedings Series. A glossary of PNE terms in four languages (English, French, Russian and Spanish) and the second volume of a PNE bibliography, covering the period 1969-79, were published in 1980.

E/5. A register for taking note of Member States that wish to be registered as potential suppliers of PNE-related services has been opened.

PLANS FOR 1983-84

E/6. Activities will depend on the prospects for using PNEs, particularly in developing countries.

E/7. The phenomenology and practical aspects of PNEs will be considered in 1984 at the sixth in a series of meetings (Table E.3, No.1).

E/8. The report prepared in 1977 by the Ad Hoc Advisory Group on Nuclear Explosions for Peaceful Purposes, summarizing the status of PNEs and their economic, health, safety and legal aspects, will be the subject of review and updating if justified by the scope of new information available.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

E/9. The Agency's activities in the field of information exchange on PNEs may, if Member States so desire, continue through further Technical Committee meetings and smaller meetings of experts on specific topics.

E/10. Reports on the technical status of PNEs, the PNE bibliography and the PNE glossary will be updated as necessary.

E/11. The Agency will continue to be prepared to respond to requests for PNE-related services.

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table E.3

No.	Document	Users	Source	Year of issue	Paragraph
1.	Report on phenomenology and practical aspects of PNEs	All interested Member States	TC 84/1	1984	E/7.

TECHNICAL COMMITTEE IN 1984

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meeting given below. The reference following the meeting is to the relevant paragraph in the text.

1. Technical Committee on the phenomenology and practical aspects of nuclear explosions for peaceful purposes E/7.

F. FOOD AND AGRICULTURE

COSTS OF THE PROGRAMME

Summary of items of expenditure: Table F.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	791 784
Consultants	69 854
Overtime	-
Temporary assistance	-
Sub-total	861 638
Common staff costs	282 850
Travel	23 355
Meetings	
Conferences, symposia, seminars	54 581
Technical committees, advisory groups	3 600
Representation and hospitality	3 089
Scientific and technical contracts	625 881
Common services, supplies and equipment	7 283
Other items of expenditure	-
Transfer of costs:	
Translation and records services	83 303
Printing and publishing services	205 325
Data processing services	12 886
Laboratory services	1 427 980
Conference and contracts services	31 382
TOTAL	3 623 153

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
903 000	55 000	-	55 000	958 000	1 041 000	1 124 000
91 100	2 600	(46 200)	(43 600)	47 500	32 500	35 000
400	100	-	100	500	500	600
3 400	300	(300)	-	3 400	3 700	4 000
997 900	58 000	(46 500)	11 500	1 009 400	1 077 700	1 163 600
279 000	27 700	-	27 700	306 700	332 800	360 100
37 400	4 100	2 000	6 100	43 500	60 000	65 000
87 000	7 000	(30 000)	(23 000)	64 000	104 000	110 000
-	-	83 000	83 000	83 000	114 000	130 000
3 900	300	-	300	4 200	6 500	6 800
650 000	45 000	2 000	47 000	697 000	750 000	800 000
5 800	700	1 200	1 900	7 700	8 000	9 000
3 000	200	1 300	1 500	4 500	5 000	5 500
98 000	8 000	9 000	17 000	115 000	144 000	153 000
381 000	34 000	(85 000)	(51 000)	330 000	403 000	432 000
30 000	3 000	1 000	4 000	34 000	37 000	40 000
1 291 000	113 000	-	113 000	1 404 000	1 530 000	1 640 000
62 000	5 000	(5 000)	-	62 000	75 000	80 000
3 926 000	306 000	(67 000)	239 000	4 165 000	4 647 000	4 995 000

SUMMARY OF MANPOWER

Table F.2

Grade of post	Number of established posts											
	1981 Adjusted		1982		1982 Adjusted		Change	1983		1984 Preliminary estimate		1985 Preliminary estimate	
D	-	(1) [a]	-	(1)	-	(1)	-	-	(1)	-	(1)	-	(1)
P-5	8	(2)	7	(2)	7	(2)	-	7	(2)	7	(2)	7	(2)
P-4	6	(3)	6	(3)	6	(3)	-	6	(3)	6	(3)	6	(3)
P-3	1	(-)	1	(-)	1	(-)	-	1	(-)	1	(-)	1	(-)
P-2	1	(-)	1	(-)	1	(-)	-	1	(-)	1	(-)	1	(-)
Sub-total	16	(6)	15	(6)	15	(6)	-	15	(6)	15	(6)	15	(6)
GS	8	(6)	8	(6)	8	(6)	-	8	(6)	8	(6)	8	(6)
TOTAL	24	(12)	23	(12)	23	(12)	-	23	(12)	23	(12)	23	(12)

[a] FAO staff in brackets

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

Table F.3

	Estimates 1982-1983
Salaries and common staff costs for Professional staff	881 000
Consultants	71 000
Duty travel	43 000
Contractual services and equipment[a]	1 036 000
Operating expenses	38 000
Publications	89 000
TOTAL	2 158 000

[a] The cost of meetings is included under Contractual services on the basis of CCAQ's expenditure classification.

CHANGES IN COSTS

F/1. As will be seen from Table F.1 above, it is expected that the cost of this programme will increase by $239 000 as a net result of salary and other price increases of $306 000 and a programme decrease of $67 000.

F/2. The programme decrease of $46 200 in respect of consultants' services is related to all the sub-programmes. Programme increases are foreseen in respect of travel ($2000), scientific and technical contracts ($2000), common services, supplies and equipment ($1200) and other items of expenditure ($1300).

F/3. The programme decrease of $30 000 in respect of conferences, symposia and seminars reflects the decrease by one in the number of seminars. While no funds were required for Advisory Groups and Technical Committees in 1982, three Advisory Groups are planned for 1983 and this involves a programme increase of $83 000.

F/4. As regards the allocation of service costs, it is expected that there will be programme increases in respect of linguistic services ($9000) and data processing services ($1000). Programme decreases are foreseen in respect of printing and publishing services ($85 000) and conference and contracts services ($5000).

F/5. It is expected that the contribution by FAO towards the financing of the activities of the Joint FAO/IAEA Division will be $2 158 000 for the two-year period 1982-83, as shown in Table F.3 above.

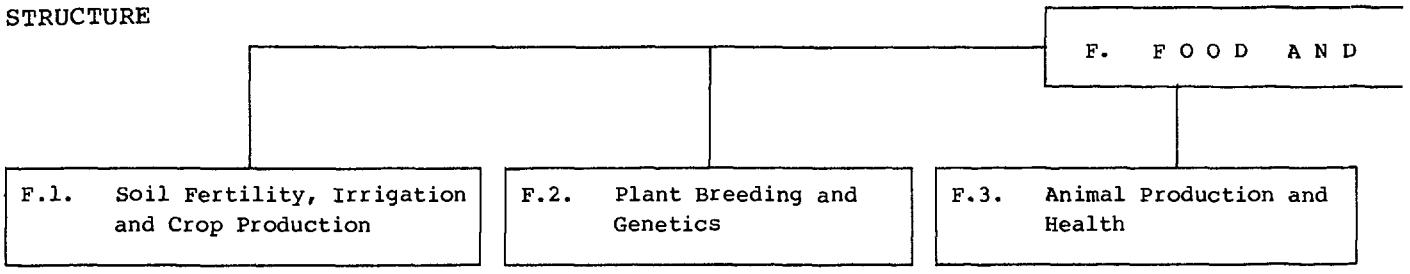
F/6. As can be seen from Table 1 (CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that the Federal Republic of Germany will contribute an amount of $76 000 for activities relating to nitrogen residues and that Japan will make a contribution of $80 000 under RCA. It is also expected that Sweden will support the research contracts programme with a contribution of $150 000. A contribution from Italy in the amount of $260 000 is expected for co-ordinated research programmes and a contribution of $35 000 from the United States for a tsetse fly project in Tanzania.

THE PROGRAMME

OBJECTIVE

F/7. The objective is to foster applications of isotopes and radiation related to food and agriculture under a joint FAO/IAEA programme aimed at increasing the ability of Member States, and especially developing countries, to apply effective nuclear techniques in research and development (where necessary in combination with other advanced methods), so as economically to increase agricultural production, reduce post-harvest losses and minimize pollution of food and the environment.

STRUCTURE



F.1. Soil Fertility, Irrigation and Crop Production

- F.1.1. Optimizing the biological fixation of atmospheric nitrogen in crops by means of nuclear techniques
- F.1.2. Increasing fertilizer efficiency by means of nuclear techniques
- F.1.3. Optimizing utilization of natural agricultural and soil resources through nuclear techniques
- F.1.4. Increasing water use efficiency through nuclear techniques

F.2. Plant Breeding and Genetics

- F.2.1. Development of induced mutation technology
- F.2.2. Crop improvement through induced mutations
- F.2.3. Identification and evaluation of germ plasm for plant breeding by means of nuclear techniques

F.3. Animal Production and Health

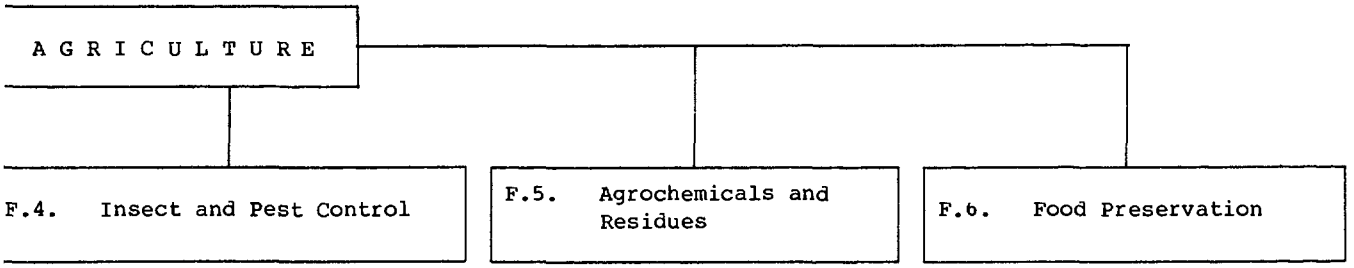
- F.3.1. Improving animal production through the development and application of nuclear techniques
- F.3.2. Improving animal health through the development and application of nuclear techniques

Summary of manpower and costs by sub-programme

Table F.4

Sub-programme	1983 Estimate		
	Man-years P	Man-years GS	Costs
Soil fertility, irrigation and crop production	4.2(0.2)[a]	1.4(1.1)	1 015 000
Plant breeding and genetics	2.2(1.2)	1.4(1.2)	760 000
Animal production and health	1.2(1.1)	1.3(0.2)	344 000
Insect and pest control	2.1(1.2)	1.3(1.2)	1 097 000
Agrochemicals and residues	1.2(2.1)	2.2(0.2)	396 000
Food preservation	4.1(0.2)	0.4(2.1)	553 000
TOTAL	15.0(6.0)	8.0(6.0)	4 165 000

[a] FAO staff in brackets.



F.4.1. Development of the sterile-insect technique for the control of tsetse and other biting flies

F.4.2. Development of the sterile-insect technique against fruit flies

F.4.3. Development of insect pest management systems by means of isotope and radiation techniques

F.5.1. Improving the efficacy of agrochemicals in protecting food sources from pests by means of nuclear techniques

F.5.2. Improving the safe use of agrochemicals by determining their fate in plants, animals, food and the environment by means of nuclear techniques

F.5.3. Improving the use of agricultural wastes by means of nuclear techniques

F.6.1. Technological and economic feasibility of food irradiation

F.6.2. Public health acceptance and regulatory aspects of the process of food irradiation

1984 Preliminary estimate			1985 Preliminary estimate		
Man-years		Costs	Man-years		Costs
P	GS		P	GS	
4.2(0.2)	1.4(1.1)	1 037 000	4.2(0.2)	1.4(1.1)	1 122 000
2.2(1.2)	1.4(1.2)	846 000	2.2(1.2)	1.4(1.2)	922 000
1.2(1.1)	1.3(0.2)	355 000	1.2(1.1)	1.3(0.2)	387 000
2.1(1.2)	1.3(1.2)	1 206 000	2.1(1.2)	1.3(1.2)	1 291 000
1.2(2.1)	2.2(0.2)	470 000	1.2(2.1)	2.2(0.2)	593 000
4.1(0.2)	0.4(2.1)	733 000	4.1(0.2)	0.4(2.1)	680 000
15.0(6.0)	8.0(6.0)	4 647 000	15.0(6.0)	8.0(6.0)	4 995 000

SUB-PROGRAMME F.1

Soil fertility, irrigation and crop production

OBJECTIVE

F.1/1. The objective is to advise and assist Member States of the Agency and FAO in connection with the most economical ways of increasing crop production through problem-oriented research on soil fertility, plant nutrition, crop production and irrigation using isotope and radiation techniques.

PROGRAMME TRENDS FOR 1983-84

F.1/2. The manufacture of fertilizers involves the consumption of considerable amounts of energy and the products tend to be expensive. There is therefore a continuing need to develop management practices which will increase the efficiency of fertilizer utilization and reduce the need for its use.

F.1/3. Proper soil management practices related to nitrogen fixation help to increase production in multiple cropping systems and pastures, and improved water management techniques are needed with both rain-fed and irrigated agriculture.

F.1/4. These aspects of work on the improvement of crop production can be studied by means of isotope and radiation techniques and are supported in the programme through co-ordinated research programmes and technical co-operation field projects. Special emphasis is placed on studies designed to help small farmers become less dependent on expensive fertilizers.

Soil fertility, irrigation and crop production

Summary by programme components

Table F.5

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Optimizing the biological fixation of atmospheric nitrogen in crops by means of nuclear techniques	1.3 (0.1)[a]	0.4 (0.3)	97 800	-	40 000	2 200	140 000
Increasing fertilizer efficiency by means of nuclear techniques	1.3 (-)	0.4 (0.3)	97 800	-	30 000	1 200	129 000
Optimizing utilization of natural agricultural and soil resources through nuclear techniques	1.3 (0.1)	0.4 (0.3)	96 700	-	30 000	1 300	128 000
Increasing water use efficiency through nuclear techniques	0.3 (-)	0.2 (0.2)	24 000	62 000	20 000	1 000	107 000
Linguistic services	-	-	-	-	-	25 000	25 000
Printing and publishing services	-	-	-	-	-	118 000	118 000
Data processing services	-	-	-	-	-	12 000	12 000
Laboratory services	-	-	-	-	-	338 000	338 000
Conference and contracts services	-	-	-	-	-	18 000	18 000
TOTAL	4.2 (0.2)	1.4 (1.1)	316 300	62 000	120 000	516 700	1 015 000

[a] FAO staff in brackets.

Optimizing the biological fixation of atmospheric nitrogen in crops by means of nuclear techniques (component F.1.1)

Objective

F.1.1/1. The objective is to develop practices through research on symbiotic and non-symbiotic systems in order to optimize biological fixation of atmospheric nitrogen in monoculture and multiple cropping systems with the aim of reducing the need for energy-intensive and costly nitrogen fertilizers.

Results to date

F.1.1/2. Measurements of the effects on atmospheric nitrogen fixation produced by the application of nitrogen and phosphate fertilizers have been made under a SIDA-supported CRP (Table F.11, No.1).

Plans for 1983-84

F.1.1/3. Following the completion of the SIDA-supported CRP (Table F.11, No.1) on dinitrogen fixation, an FAO/IAEA seminar will be held on the use of isotopes in studies of biological nitrogen fixation (Annex II(10) and Table F.12, No.1).

F.1.1/4. Two CRPs dealing with multiple cropping, i.e. intercropping of alternate rows of cereal (maize or sorghum) and a legume crop, and with pastures (Table F.11, Nos 3 and 5) will be continued in order to study the effect of different management practices on biological fixation of nitrogen in the field, the efficiency of forage legumes as suppliers of nitrogen for the soil-plant-animal system and the benefits of improved pastures in terms of animal nutrition (in collaboration with the "Animal production and health" sub-programme).

F.1.1/5. Studies of the effect of agricultural chemicals on biological nitrogen fixation and on nitrogen fertilizer uptake will continue under a CRP (Table F.11, No.2) carried out in collaboration with the "Agrochemicals and residues" sub-programme.

Related activities

F.1.1/6. Nine technical co-operation field projects were operational during 1981, in addition to parts of three large-scale projects. Four training courses (in conjunction with other programme components), two workshops and individual fellowships were arranged in connection with work on techniques related to isotope applications in studies of biological nitrogen fixation. These activities will be continued.

F.1.1/7. The Agency's Laboratory supports this component in terms of training and services.

New developments foreseen for 1985-88

F.1.1/8. New activities relating to the improvement of non-symbiotic biological nitrogen fixation in association with cereal grasses and tree crops are foreseen, an important start having been made in one large-scale technical co-operation field project in Brazil. Measurements will also be made of the improvement in symbiotic nitrogen fixation by legumes innoculated with both rhizobium and mycorrhiza when the soil phosphorus level is very low.

Co-operation with other organizations

F.1.1/9. This programme component involves co-operation with UNDP, UNEP, SIDA, IRRI, ICRISAT, IITA, ICARDA, IFDC, SCOPE, ESNA, DCS and ISSS.

Increasing fertilizer efficiency by means of nuclear techniques (component F.1.2)

Objective

F.1.2/1. The objective is to develop efficient fertilizer management practices with the aim of reducing energy-intensive and costly fertilizer requirements, especially for subsistence farmers.

Results to date

F.1.2/2. Initial results have quantified the advantages of special nitrogen fertilizer application practices with intercropped legume/non-legume systems.

Plans for 1983-84

F.1.2/3. The CRP on efficient water and fertilizer management practices for semi-arid regions (Table F.11, No.4) will be completed. Work on two other programmes related to this component (Table F.11, Nos 3 and 5) will continue. It is planned to start a CRP related to tree crops in 1982.

Related activities

F.1.2/4. Thirteen technical co-operation field projects were operational during 1981 in addition to parts of five large-scale projects. In addition, five training courses (in conjunction with other programme components), a number of workshops and individual fellowships were organized in connection with work on techniques related to isotope applications in studies of fertilizer utilization efficiency. These activities will be continued.

F.1.2/5. The Agency's Laboratory supports this component in terms of training and services.

Co-operation with other organizations

F.1.2/6. This programme component involves co-operation with UNDP, SIDA, IRRI, ICRISAT, IITA, ICARDA, IFDC, ESNA and ISSS.

Optimizing utilization of natural agricultural and soil resources through nuclear techniques (component F.1.3)

Objective

F.1.3/1. The objective is to develop methods for optimizing the use of natural agricultural and soil resources for crop production in order to reduce the dependence of small farmers on costly fertilizers and other agricultural inputs (in collaboration with the "Agrochemicals and residues" sub-programme).

Results to date

F.1.3/2. Recent field experiments carried out under a GSF-supported CRP (Table F.11, No.20) have demonstrated that proper soil and fertilizer management practices can help to reduce the amounts of fertilizer lost through leaching and denitrification under different soil and climate conditions.

F.1.3/3. Field activities have shown that some local sources of natural rock phosphates can effectively replace fertilizer phosphates in acid soils.

Plans for 1983-84

F.1.3/4. The CRP (Table F.11, No.20) will terminate in 1983. A newly established programme will study the use of agricultural waste as a fertilizer material (in collaboration with the "Agrochemicals and residues" sub-programme (Table F.11, No.25)).

F.1.3/5. A CRP will be initiated in 1982 for the purpose of investigating by means of nuclear techniques the potential of mycorrhizal fungi in increasing the uptake by food crops of nutrients already present in the soil.

Related activities

F.1.3/6. Five technical co-operative field projects were operational during 1981 in addition to parts of three large-scale projects. Three training courses (in conjunction with other programme components), a number of training workshops and individual fellowships were organized in connection with work on techniques related to isotope applications in relevant studies. These activities will be continued.

F.1.3/7. Studies of plant root distributions and measurements of direct fertilizer uptake will be carried out under field projects.

F.1.3/8. The Agency's Laboratory supports this component in terms of training and services.

New developments foreseen for 1985-88

F.1.3/9. Work will be started on the development of management practices for improved recovery of nutrients from animal manures and from agro-industrial wastes applied to the soil. The ability of mycorrhizal associations to improve the utilization of soil nutrients and the availability of natural sources of nutrients such as rock phosphates or waste products will be studied.

Co-operation with other organizations

F.1.3/10. This programme component involves co-operation with UNDP, UNEP, GSF, SIDA and international agricultural research centres.

Increasing water use efficiency through nuclear techniques (component F.1.4)

Objective

F.1.4/1. The objective is to develop efficient water management practices under rain-fed farming conditions in semi-arid regions and to examine the effect of irrigation water quality and management on crop water requirements and on salt build-up or leaching in the soil.

Results to date

F.1.4/2. The ability of tillage systems to conserve soil water and the effect of this additional water on crop yield and nitrogen fertilizer utilization efficiency have been studied under a CRP (Table F.11, No.4). Systems found to be successful in some countries were not always adaptable to the different climatic situations of other countries.

Plans for 1983-84

F.1.4/3. The influence of various crops rotations or cultural practices on the supply and conservation of available soil water and the interaction between water use efficiency and nitrogen fertilizer utilization will continue

to be studied under the CRP (Table F.11, No.4). A symposium in 1983 (Annex I(10), and Table F.12, No.2) will consider the advances in the field of isotope and radiation techniques in soil physics and irrigation studies.

F.1.4/4. A status report will be produced on the effect of irrigation water quality and irrigation management on yield and crop water requirements (with special reference to saline and salt-affected soils (Table F.12, No.3)). A CRP will be started in 1984 to cover outstanding problems in this area.

F.1.4/5. A review will be made of water management practices (such as no-tillage) for conserving water and the effect of such practices on fertilizer efficiency (Table F.12, No.4).

Related activities

F.1.4/6. Fifteen technical co-operation field projects were operational during 1981 in addition to parts of four large-scale projects. Three training courses (in conjunction with other programme components) and individual fellowships were organized in connection with work on techniques related to isotope applications in relevant studies. These activities will be continued.

F.1.4/7. The Agency's Laboratory supports this component in terms of training and services.

Co-operation with other organizations

F.1.4/8. This programme component involves co-operation with UNDP, UNEP and international agricultural research centres.

SUB-PROGRAMME F.2

Plant breeding and genetics

OBJECTIVE

F.2/1. The objective is to assist and advise Member States of the Agency and FAO in connection with genetic improvement of crop plants through the use of radiation and isotope techniques.

PROGRAMME TRENDS FOR 1983-84

F.2/2. Improved varieties of crop plants make a fundamental contribution to progress in agriculture by providing genotypes or populations of genotypes that are well adapted to agroclimatic conditions and interact with the environment and agricultural inputs in a favourable way. To be useful, new varieties should have a capacity for high production and be of good quality, tolerant to stresses and resistant to diseases. Finally, they should be efficient in the use of the energy from the sun and the water and fertilizer supplied to the soil.

F.2/3. Mutation breeding is a particularly useful technique when an already established variety needs improvement in a specific characteristic such as architecture, maturity time or disease resistance. During the last 15-20 years, it has become an established part of many plant breeding programmes and has increasingly contributed to the improvement of crop plant varieties.

F.2/4. Isotopic tracers provide efficient tools for following biochemical pathways and investigating the efficiency of metabolic processes such as nutrient uptake, photosynthesis or translocation. They can further help in identifying superior genotypes and improving our knowledge of parasitic and symbiotic associations.

F.2/5. The Agency supports research and training in these areas through co-ordinated research programmes and technical co-operation with Member States. In particular, the work concentrates on: (i) mutation induction, where more efficient methods with a higher output of useful mutants are sought, and known methods have to be adapted to various plant species; (ii) mutant selection, where screening methods for a wide array of desirable traits need to be developed; and (iii) mutant use, where mutants have to be developed into varieties, often by recombining valuable characteristics through cross breeding. The essential aim is to achieve greater yields, higher resistance to diseases and pests, and better nutritional quality in major crop plants.

Plant breeding and genetics

Summary by programme components

Table F.6

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Development of induced mutation technology	0.8 (0.4)[a]	0.5 (0.4)	79 300	-	20 000	2 700	102 000
Crop improvement through induced mutations	0.8 (0.4)	0.5 (0.4)	65 000	-	50 000	3 000	118 000
Identification and evaluation of germ plasm for plant breeding by means of nuclear techniques	0.6 (0.4)	0.4 (0.4)	47 300	-	50 000	2 700	100 000
Linguistic services	-	-	-	-	-	25 000	25 000
Printing and publishing services	-	-	-	-	-	42 000	42 000
Data processing services	-	-	-	-	-	15 000	15 000
Laboratory services	-	-	-	-	-	351 000	351 000
Conference and contracts services	-	-	-	-	-	7 000	7 000
TOTAL	2.2 (1.2)	1.4 (1.2)	191 600	-	120 000	448 400	760 000

[a] FAO staff in brackets.

Development of induced mutation technology (component F.2.1)

Objective

F.2.1/1. The objective is to gain further insight into mutagen action on plant material; to develop appropriate techniques for detecting mutants with improved characteristics and to examine the genetic basis of mutated traits; to develop in vitro methods for mutation induction and mutant selection and to find suitable ways of altering traits with cytoplasmic inheritance.

Results to date

F.2.1/2. Methods for the safe handling of radiation and other mutagens were published in the 1977 revised edition of the "Manual on Mutation Breeding" and have been further disseminated through training courses.

F.2.1/3. A review of the state of knowledge concerning the induction of mutations in genetic traits inherited in ways other than through chromosomes was made in 1981: guidelines for future Agency action were formulated with the assistance of consultants.

Plans for 1983-84

F.2.1/4. Research will be supported through individual contracts (with support from the Agency's Laboratory) on mutation induction in legumes, oil seeds, root and tuber crops, and wild plant species to be domesticated for industrial use. This will include work on developing optimal systems for harvesting seeds from mutagen-treated M_1 plants in order to achieve M_2 populations rich in mutants of potential value to breeders.

F.2.1/5. Guidelines on the use of mutation breeding techniques will be formulated (Table F.12, No.5).

Related activities

F.2.1/6. Technical co-operation projects with the Nuclear Research Laboratory at New Delhi (India), the Institute of Nuclear Agriculture at Mymensingh (Bangladesh) and the National Nuclear Research Centre at Legon (Ghana) were serviced in 1981.

F.2.1/7. A training course on applied mutagenesis in crop plants will be held at the Agency's Laboratory in 1982. Further training courses are planned on mutation breeding technology.

F.2.1/8. The Agency's Laboratory will continue to offer various types of training, to carry out supporting research on plant mutagenesis and to provide mutagen treatment services.

New developments foreseen for 1985-88

F.2.1/9. More emphasis will be placed on mutation techniques involving haploid plants and in vitro cultures. The capability of mutation induction techniques to alter cytoplasmically inherited traits (such as cytoplasmic male sterility used in the production of F_1 hybrid seeds) will be tested.

Co-operation with other organizations

F.2.1/10. This programme component involves co-operation with EURATOM, ESNA, ISNA and various plant genetics associations.

Crop improvement through induced mutations (component F.2.2)

Objective

F.2.2/1. The objective is to evaluate mutants having improved characteristics, to use them in developing improved cultivars (with emphasis on improving productivity components of grain legumes and oil crops) and to collect information about successful procedures and valuable mutant stocks to be disseminated through the "Mutation Breeding Newsletter".

Results to date

F.2.2/2. As a result of the Agency's research co-ordination and support, economic gains at the farm level have been achieved: (a) from rice mutant varieties in Bangladesh, Burma, France, Hungary, India, Japan, Pakistan, Thailand and the United States; (b) from groundnut, sugar cane, millet, castor bean and rape mutants in India; (c) from barley mutants in Czechoslovakia, the German Democratic Republic, Sweden and the United Kingdom; (d) from wheat mutants in Greece, Italy, Pakistan and the Soviet Union; (e) from pea mutants in Poland; (d) from fruit tree mutants in the Soviet Union.

F.2.2/3. Valuable germ plasm has been made available to Member States within the framework of an FAO/IAEA/GSF programme (Table F.11, No.6), with institutes

in 32 Member States, on improving the nutritional value of cereal grain through induced mutations (phase II of the programme, with additional aid from SIDA). In addition, a methodology for chemical and feeding tests has been developed and standardized, thus allowing Member States to effectively take up or continue breeding for improved grain protein.

F.2.2/4. Information on host/pathogen relationships and mechanisms of resistance has been obtained from an FAO/IAEA/SIDA CRP for establishing a methodology to improve by induced mutations the inherited resistance of cereals and grain legumes to diseases (Table F.11, No.7). Several institutes have been successful in obtaining mutants with better disease resistance, which are now being used in cross breeding.

F.2.2/5. The "Mutation Breeding Newsletter", issued twice a year, has continued to inform scientists and practical plant breeders in Member States of advances in mutation induction and selection technology, and of mutant-derived varieties released for commercial use.

Plans for 1983-84

F.2.2/6. A CRP aimed at increasing the production of grain legumes in South East Asia (RCA) will continue (Table F.11, No.8). A new long-term programme will focus more specifically on root and tuber crops of importance to developing countries. Work on the improvement of disease and insect pest resistance in various crop plants (Table F.11, No.7) will continue.

F.2.2/7. Work on crop improvement through induced mutations will be supported through the regional CRPs on the improvement of grain legume production in South East Asia (Table F.11, No.8), on leguminous and oil seed crops for Latin America (Table F.11, No.11), and on leguminous food crops for Africa and the Near East (Table F.11, No.10).

F.2.2/8. The "Mutation Breeding Newsletter" will continue to be issued (Table F.12, No.6).

Related activities

F.2.2/9. Technical co-operation projects in 16 countries were serviced in 1981.

F.2.2/10. Training courses have been held in Indonesia (1979) and Venezuela (1980). Further courses are planned in Bulgaria, Egypt and Hungary.

F.2.2/11. The Agency's Laboratory will continue to provide assistance through training and advice and to carry out radiation treatments.

New developments foreseen for 1985-88

F.2.2/12. Work on crop plants is expected to focus on improved efficiency in the use of solar energy, water, fertilizer and other inputs.

Co-operation with other organizations

F.2.2/13. This programme component involves co-operation with EUCARPIA, SABRAO and other plant-breeding/plant genetics associations.

Identification and evaluation of germ plasm for plant breeding by means of nuclear techniques (component F.2.3)

Objective

F.2.3/1. The objective is to supplement genetic resources currently available to plant breeders through evaluation and recombination of mutant

traits and through the identification of superior genotypes by nuclear techniques, and by means of this work to assist conventional plant breeding programmes.

Results to date

F.2.3/2. A collection of induced mutants with altered disease reaction has been made available to Member States from research work carried out within the framework of a SIDA-sponsored CRP on the improvement of the disease resistance of crop plants.

F.2.3/3. Information on mutant lines of potential value for cross breeding has been published in the "Mutation Breeding Newsletter".

F.2.3/4. Work by the Agency's Laboratory has shown that it is possible to use nitrogen-15 techniques to identify differences in nitrogen fixation capacity in mutant stocks of legumes.

Plans for 1983-84

F.2.3/5. The CRPs related to the evaluation of semi-dwarf cereal mutants and to semi-dwarf mutants for rice improvement in South East Asia will continue (Table F.11, Nos 9 and 12). Efforts will be made under these programmes to make available to plant breeders alternative sources of short culm.

F.2.3/6. Work will be done under existing CRPs (Table F.11, Nos 1 and 8) and through laboratory support on the use of nitrogen-15 techniques for identifying genetic stocks with higher nitrogen fixation capability.

Related activities

F.2.3/7. Technical co-operation projects in Bangladesh, India, Malaysia and Thailand were serviced in 1981.

F.2.3/8. The Agency's Laboratory will continue to provide assistance through training and methodological research. Expertise in tracer techniques will be available for the assessment of physiological characteristics of genetic stocks produced by plant breeders in Member States.

Co-operation with other organizations

F.2.3/9. This programme component involves co-operation with international agricultural research centres, gene banks and other institutions holding germ plasm collections.

SUB-PROGRAMME F.3

Animal production and health

OBJECTIVE

F.3/1. The objective is to assist and advise Member States of the Agency and FAO in connection with research on optimizing animal production and improving the health and protection of domestic livestock through the use of nuclear techniques (including work on animal physiology and nutrition, disease control and adaptation of animals to their environment).

PROGRAMME TRENDS FOR 1983-84

F.3/2. In many regions of the world, animal production is limited by poor growth, reproductive performance and milk production. Various aspects of

these problems are best studied through nuclear techniques because isotope methods often provide the most sensitive and in many cases the only means of labelling animal nutrients and metabolites.

F.3/3. Another major limitation to increased production is that caused by parasitic and other diseases. Isotope techniques can be used to provide a well-defined picture of the effect that parasites have on hosts and also assist in getting a clear picture of how different management practices and stock genotypes (breeds and species) can be modified to reduce the effect of the parasite or disease. Ionizing radiation can also be used in the production of attenuated vaccines against some parasites.

F.3/4. Emphasis will be placed on the use of nuclear techniques to increase the level and efficiency of animal production in arid and tropical regions, to evaluate and improve indigenous species of animals, and to improve the utilization of locally available feed resources for ruminant livestock, the production of vaccines and the nutritional value of low-quality feedstuffs.

Animal production and health

Summary by programme components

Table F.7

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Improving animal production through the development and application of nuclear techniques	0.6 (0.6)[a]	0.7 (0.1)	65 300	-	70 000	5 700	141 000
Improving animal health through the development and application of nuclear techniques	0.6 (0.5)	0.6 (0.1)	78 600	-	53 000	5 400	137 000
Linguistic services	-	-	-	-	-	12 000	12 000
Printing and publishing services	-	-	-	-	-	46 000	46 000
Data processing services	-	-	-	-	-	1 000	1 000
Conference and contracts services	-	-	-	-	-	7 000	7 000
TOTAL	1.2 (1.1)	1.3 (0.2)	143 900	-	123 000	77 100	344 000

[a] FAO staff in brackets.

Improving animal production through the development and application of nuclear techniques (component F.3.1)

Objective

F.3.1/1. The objectives are: to improve the nutrition, health and reproductive efficiency of domestic buffalo; to evaluate hormone functions in relation to the reproductive capabilities of farm animals; to improve locally available feed resources; and to increase grazing animal productivity in the Mediterranean and North African region.

Results to date

F.3.1/2. Research on improving buffalo production in several Asian countries has been carried out under a multi-disciplinary CRP (RCA) (Table F.11, No.13). The proceedings of the co-ordinated research meeting held in 1981 have been published by the Chulalongkorn University, Bangkok, Thailand, and are a valuable reference for other researchers working on buffalo production.

Plans for 1983-84

F.3.1/3. The CRPs will continue on buffalo production in Asia (RCA), on the utilization of non-protein nitrogen and agro-industrial by-products as animal feed resources and on improving animal production from pasture (in collaboration with the "Soil fertility, irrigation and crop production" sub-programme) (Table F.11, Nos 5, 13 and 14). Four new programmes are planned to start in 1983 on: improving the reproductive performance of ruminant animals through the use of modern methods to assess problems of infertility and to diagnose pregnancy; the use of nuclear techniques to evaluate and enhance the nutrient value of locally available potential feed resources such as domestic waste and agro-industrial by-products; to increase protein production through research on aquacultural farming methods; and increasing the productivity of indigenous animal species in harsh, arid and/or tropical environments.

F.3.1/4. A training manual on reproduction in domestic animals and the application of tracer techniques to hormone analyses will be published (Table F.12, No.7).

Related activities

F.3.1/5. Technical co-operation projects on the utilization of nuclear techniques in animal nutrition and physiology were active in 19 Member States in 1981 and included parts of five large-scale projects in agriculture. The number is expected to increase.

F.3.1/6. A specialized interregional training course supported by DANIDA was held in 1981 on "The Use of Radioisotopes and Radiation in Animal Production Research with Particular Reference to Mineral Nutrition". A training course on radioimmunoassay techniques and their application to improving the reproductive efficiency of domesticated animals was held in 1982 in the United States, and a regional training course and a study tour on animal production research were held in Australia.

New developments foreseen for 1985-88

F.3.1/7. Greater emphasis will be placed on research into indigenous species and available potential feed resources in tropical and semi-tropical regions. The integrated multi-disciplinary programme on increasing the productivity of domestic buffalo in Asia will act as a model for future programmes on increasing the productivity of indigenous species.

Co-operation with other organizations

F.3.1/8. This sub-programme component involves co-operation with UNDP, FAO, DANIDA, ILCA and SIDA.

Improving animal health through the development and application of nuclear techniques (component F.3.2)

Objective

F.3.2/1. The objective is to investigate the immunological and pathogenic effects of vector-borne (including parasitic) diseases and devise control measures against them.

Results to date

F.3.2/2. A CRP on the control of tick and tick-borne diseases demonstrated the value of isotope tracers and radiation in the study of pathophysiological and immunological responses of host animals to parasitic infections and the possibility of developing radiation-attenuated vaccines against tick-borne diseases.

F.3.2/3. In collaboration with the Life Sciences Division, an FAO/IAEA/UNEP symposium was held in Vienna in 1981 on nuclear techniques in the study and control of parasitic diseases of man and animals.

F.3.2/4. A laboratory training manual on the use of nuclear techniques in animal parasitology was prepared in 1981.

Plans for 1983-84

F.3.2/5. The CRP on tick and tick-borne diseases, completed in 1982, will be replaced by a programme on parasitic diseases such as trypanosomiasis and fascioliasis (Table F.11, No.15). The emphasis in this new programme will be on the development and assessment of irradiation-attenuated vaccines and on the immunology aspects of host-parasite relationships.

F.3.2/6. The potential applications of nuclear techniques in the study of economically important tropical diseases will be reviewed (Table F.12, No.8).

Related activities

F.3.2/7. Under this component, 13 technical co-operation projects were serviced in 1981.

F.3.2/8. An interregional training course on the application of nuclear techniques to study parasitic diseases, to be sponsored by DANIDA, is planned for Kenya in 1983.

New developments foreseen for 1985-88

F.3.2/9. Integrated multi-disciplinary programmes will be used to study the effects of disease and resistance to disease in indigenous species.

F.3.2/10. A regular biennial training course will be started on nuclear techniques in animal parasitology and immunology.

Co-operation with other organizations

F.3.2/11. This component involves co-operation with UNDP, UNEP, FAO, ILRAD and DANIDA.

SUB-PROGRAMME F.4

Insect and pest control

OBJECTIVE

F.4/1. The objective is to assist and advise Member States of the Agency and FAO in connection with the solution of pest management problems and the development of pest control programmes through the application of isotopes and radiation.

PROGRAMME TRENDS FOR 1983-84

F.4/2. Losses caused by insects in agricultural production and storage remain unacceptably high, particularly in developing Member States. These losses frequently exceed 25% of the total agricultural production. Furthermore, disease-carrying insects are a serious problem to the agricultural producer. Difficulties arising from insecticide resistance, and the irresponsible use and the high cost of insecticides have resulted in a search for alternative methods of controlling some of the more serious insect pests. When properly utilized, the SIT (sterile-insect technique) has proved to be an effective method of insect control and eradication.

F.4/3. Integrated pest management systems require a detailed knowledge of pest/predator interactions, as well as of insect behaviour, movement and overall ecology: in this connection, the use of isotopes is an extremely powerful tool in studying insect ecology.

F.4/4. The programme for the control of tsetse flies and other haematophagous insects by the SIT will continue. The Agency is involved in a 6-year (1979-84) co-operative field project (BICOT) with the Government of Nigeria to investigate in the field the advantages, efficacy and cost/benefits of the SIT to control or eradicate riverine tsetse flies. The project is supported by the Governments of Belgium, the Federal Republic of Germany, Italy, Sweden and the United Kingdom. The Agency's Laboratory provides training and technical services.

F.4/5. The programme for the control of fruit flies by the SIT continues to emphasize developing methods which are adapted to individual ecological situations in support of field projects in developing Member States. The Agency's Laboratory provides training and technical support.

Insect and pest control

Summary by programme components

Table F.8

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Development of the sterile-insect technique for the control of tsetse and other biting flies	0.8 (0.4)[a]	0.5 (0.4)	79 400	28 000	50 000	4 600	162 000
Development of the sterile-insect technique against fruit flies	0.7 (0.4)	0.5 (0.4)	68 400	-	40 000	2 600	111 000
Development of insect pest management systems by means of isotope and radiation techniques	0.6 (0.4)	0.3 (0.4)	57 000	-	30 000	6 000	93 000
Linguistic services	-	-	-	-	-	13 000	13 000
Printing and publishing services	-	-	-	-	-	41 000	41 000
Data processing services	-	-	-	-	-	4 000	4 000
Laboratory services	-	-	-	-	-	665 000	665 000
Conference and contracts services	-	-	-	-	-	8 000	8 000
TOTAL	2.1 (1.2)	1.3 (1.2)	204 800	28 000	120 000	744 200	1 097 000

[a] FAO staff in brackets.

Development of the sterile-insect technique for the control of tsetse and other biting flies (component F.4.1)

Objective

F.4.1/1. The objectives are to develop practices for the field application of the sterile-insect technique in eradicating or controlling the tsetse fly and other haematophagous (blood-sucking) insects, to develop diets for insects with a view to reducing or eliminating dependence on host animals and to incorporate chemicals or pharmaceuticals in these diets to reduce or eliminate the vectorial capacity of the released insects.

Results to date

F.4.1/2. The in vivo mass rearing system for the tsetse fly (Glossina palpalis) has been perfected in the Agency's Laboratory and transferred to the Nigerian BICOT project. One-year ecological studies for both dry and wet seasons have been completed at the BICOT site and a field facility at the release site is nearing completion. Many of the ingredients in blood necessary for the maintenance of the tsetse fly have been identified. Freeze-drying of blood involving co-mixtures and irradiation has produced a storable, dried material which, upon reconstitution, is equivalent in quality to live hosts. Preliminary studies are now in progress to assess the effectiveness of various anti-trypanosomal drugs as deterrents to the development of trypanosomes in the tsetse fly.

Plans for 1983-84

F.4.1/3. The CRPs on tsetse fly control or eradication by the SIT (Table F.11, No.17) and on the use of radiation and isotopes to develop diets for mass rearing of tsetse and to study disease transmission by these vectors (Table F.11, No.18) are directed primarily to the needs of the BICOT project in Vom, Nigeria, and the SIT tsetse projects in Zambia and other African Member States. Research within these CRPs will continue and will involve ecological, mass-rearing and release studies conducted primarily through field projects and laboratory research on freeze-dried blood, disease transmission, vectorial capacity and radiolabelling.

F.4.1/4. A CRP on the use of radiation and isotopes in integrated pest management programmes with emphasis on rice insects (Table F.11, No.19) will continue to investigate the use of labelled insects, plants, parasites and predators in the determination of host-pest-predator and/or -parasite relationships to derive pest management programmes minimizing the use of pesticides and other ecologically disturbing measures for pest control.

F.4.1/5. A CRP will be started in 1983 on the control and/or eradication of human and animal vectors of disease (in collaboration with the "Animal production and health" sub-programme and Division of Life Sciences) with the aim of determining the proper use of the SIT for the control of arthropods in integrated management programmes.

F.4.1/6. Assistance will be given with research on disease vector species and their control using isotopes and radiation (in collaboration with the "Animal production and health" sub-programme) to determine various ecological parameters such as dispersion, population dynamics and diversity.

F.4.1/7. The tsetse SIT projects will be reviewed and recommendations made for future research directions (Table F.12, No.9). An FAO/IAEA regional seminar in 1984 will serve as an educational focal point for participants from African countries to update their knowledge on relevant aspects of tsetse ecology and provide a forum for reviewing existing and planned projects (Annex II(11) and Table F.12, No.10).

Related activities

F.4.1/8. In addition to the BICOT project in Nigeria, two technical co-operation projects in Ghana and Zambia were serviced in 1981. The Agency's Laboratory will continue to carry out research and provide training in support of the field activities.

New developments foreseen for 1985-88

F.4.1/9. Work will be carried out on: the development of greater gene pool heterogeneity in tsetse fly colonies as release programmes expand; in-depth investigations into predictive computer models of field populations; and the improvement of mass sterilizing and release methods against malaria (in collaboration with the Division of Life Sciences) and Rift Valley fever vectors. The research on diets will be extended to other savannah species of tsetse fly.

Co-operation with other organizations

F.4.1/10. This component involves co-operation with WHO, UNEP, OAU, US-AID, GSF, ILRAD, ICIPE, SIDA, ODA and governmental pest control organizations.

Development of the sterile-insect technique against fruit flies (component F.4.2)

Objective

F.4.2/1. The objective is to reduce the costs and increase the effectiveness of the SIT for the control or eradication of phytophagous (plant-eating) insects in support of field projects. This involves the development of genetic sexing mechanisms and the provision of advice and support for new field projects for the control and eradication of fruit flies in Egypt and Peru.

Results to date

F.4.2/2. In support of a field project in Mexico, work has been carried out under a research programme to develop a genetic sexing mechanism whereby female medflies could be eliminated in the egg or neonate larvae stage (Table F.11, No.16). Further genetic sexing studies are in progress with heat, cold and chemicals to select conditional lethal genes to be transferred to Y chromosomes by irradiation. Chromosome mapping and isozyme investigations are also being undertaken.

F.4.2/3. Upon request from the Governments of Egypt and Peru, details have been worked out for large-scale field projects for control or eradication of the medfly by the SIT.

Plans for 1983-84

F.4.2/4. Support for the Mexican project will continue, mainly through the CRP on sexing mechanisms (Table F.11, No.16).

F.4.2/5. The development of sexing mechanisms for the mass rearing of insects will be explored with consultant assistance (Table F.12, No.11).

New developments foreseen for 1985-88

F.4.2/6. Efficient sexing mechanisms for medflies will be transferred for use in SIT field projects in Member States. Studies on F_1 sterility for the control of Lepidoptera and Coleoptera will be initiated, as will preliminary investigations on the application of this technique in field projects. The use of the SIT in the control of insect populations (in contrast to eradication) will be examined.

Related activities

F.4.2/7. Three large-scale technical co-operation projects on the control or eradication of the medfly using the SIT were operational or being planned in 1981 (Egypt, Mexico and Peru). An FAO/IAEA regional seminar and a training course were held in 1982.

F.4.2/8. The Agency's Laboratory continues to provide training and technical support.

Co-operation with other organizations

F.4.2/9. This component involves co-operation with USDA, UNDP, EPPO, UNEP, WHO, ICIPE, DCS, the Dirección General de Sanidad Vegetal of the Mexican Secretaría de Agricultura y Ganadería, and the Plant Protection Services of Egypt and Peru.

Development of insect pest management systems by means of isotope and radiation techniques (component F.4.3)

Objective

F.4.3/1. The objectives are: to solve specific pest management problems such as those associated with the optimization of insecticide application (timing and methods), target insect ecology, genetic control, host succession and migration; to determine host feeding mechanisms (in collaboration with the "Plant breeding and genetics" sub-programme); and to determine the pathogen/vector relationships in animal and plant diseases (in collaboration with the "Animal production and health" sub-programme).

Results to date

F.4.3/2. Considerable progress has been made in the Agency's Laboratory on the use of autoradiography to evaluate host plant/pest relationships and resistance in rice plant varieties to brown plant hopper biotypes. Evaluations of the use of stable isotopes have been conducted and screening techniques developed. Investigations of neutron activation of rare earths to determine plant pest/parasite or predator relationships are in progress. This work is in support of field activities in Member States carried out under a CRP (Table F.11, No.19).

Plans for 1983-84

F.4.3/3. Plant pest/parasite and predator relationships will continue to be studied under the CRP (Table F.11, No.19). Greater use will be made in the programme of neutron activation and stable isotopes; investigations into the optimization of insecticide applications and the potential of trace elements in the identification of biotypes will be carried out.

Related activities

F.4.3/4. A technical co-operation project in Sri Lanka was serviced in 1981. The Agency's Laboratory carries out research and provides training in support of the field activities.

New developments foreseen for 1985-88

F.4.3/5. As part of the CRP, field studies related to integrated pest management will be carried out by national organizations. The interaction between plant and animal disease vectors and their hosts will be investigated by means of isotope techniques.

Co-operation with other organizations

F.4.3/6. This component involves co-operation with UNDP and IOBC.

SUB-PROGRAMME F.5

Agrochemicals and residues

OBJECTIVE

F.5/1. The objective is to assist and advise Member States of the Agency and FAO in connection with nuclear-based research relating to the effective and safe use of agrochemicals and wastes aimed at preventing losses caused by pests, protecting agricultural products, minimizing pollution of the environment and conserving natural resources.

PROGRAMME TRENDS FOR 1983-84

F.5/2. Losses caused by pests (insects, weeds, plant diseases, animal parasites, etc.) in developing countries exceed 30% of agricultural production. The proper use of pesticides is the most cost-effective means of reducing these losses in most situations. Additional losses result from the inappropriate use of agricultural wastes. Furthermore, the environmental impact of large changes in agricultural practices, such as extensive deforestation, raises problems of great concern to many Member States. Nuclear techniques offer unique and powerful tools in solving many problems in these areas.

F.5/3. The programme will include the use of chemicals to determine the fate and magnitude of pesticide residues in major crops, vegetables, fish and livestock products and the use of isotope techniques to quantify total pesticide residues, including the bound portion, and to determine the mechanism of formation of the bound residue, its identity and biological availability.

F.5/4. Labelled substrates will be used to determine terminal residues in stored products and to study the degradation and dissipation of persistent pesticides and herbicides. The use of labelled controlled-release pesticide formulations for studying the behaviour of the pesticide will provide information about increasing the efficiency and simultaneously reducing terminal residues.

Agrochemicals and residues

Summary by programme components

Table F.9

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Improving the efficacy of agrochemicals in protecting food sources from pests by means of nuclear techniques	0.4 (1.2)[a]	1.0 (0.1)	47 600	-	40 000	6 400	94 000
Improving the safe use of agrochemicals by determining their fate in plants, animals, food and the environment by means of nuclear techniques	0.4 (0.7)	1.0 (0.1)	56 900	27 000	30 000	3 100	117 000
Improving the use of agricultural wastes by means of nuclear techniques	0.4 (0.2)	0.2 (-)	32 100	-	30 000	1 900	64 000
Linguistic services	-	-	-	-	-	20 000	20 000
Printing and publishing services	-	-	-	-	-	42 000	42 000
Data processing services	-	-	-	-	-	1 000	1 000
Laboratory services	-	-	-	-	-	50 000	50 000
Conference and contracts services	-	-	-	-	-	8 000	8 000
TOTAL	1.2 (2.1)	2.2 (0.2)	136 600	27 000	100 000	132 400	396 000

[a] FAO staff in brackets.

Improving the efficacy of agrochemicals in protecting food sources from pests by means of nuclear techniques (component F.5.1)

Objective

F.5.1/1. The objective is to develop methods for improving the effectiveness and efficiency of pesticides.

Results to date

F.5.1/2. This is a newly initiated activity.

Plans for 1983-84

F.5.1/3. Co-ordinated research programmes will be initiated in 1983 to develop controlled-release formulations for pesticides applied in or on the soil in tropical areas in order to improve the efficacy of: herbicides, especially against tropical weeds (in collaboration with the "Soil fertility, irrigation and crop production" sub-programme); pesticides against tsetse fly infestations in Africa; and fungicides under tropical conditions.

Related activities

F.5.1/4. One technical co-operation project was serviced in 1981, and it is anticipated that several more will be serviced in 1983-84.

Co-operation with other organizations

F.5.1/5. Co-operation and liaison will be maintained with GSF.

Improving the safe use of agrochemicals by determining their fate in plants, animals, food and the environment by means of nuclear techniques (component F.5.2)

Objective

F.5.2/1. The objective is to develop data on the fate (including metabolism, residues, movement, etc.) of agrochemicals in soil, plants, animals and water in order to improve their safe use, and to assist in the acquisition and dissemination of data needed to assess the risk to man of agrochemicals in food and the environment.

Results to date

F.5.2/2. Data have been obtained in CRPs on the fate of a number of pesticides in soil and water ecosystems (Table F.11, No.21) as well as in food crops. This information has been published in the journal "Chemosphere" and made available to Member States. Pesticides used to control paddy rice pests have shown significant differences in the rate of degradation under aerobic and anaerobic (under water in the rice paddys) conditions, primarily because of the difference in microbial activity.

Plans for 1983-84

F.5.2/3. The CRPs on pesticide residues in milk and meat (Table F.11, No.24) and on bound residues in soil and food (Table F.11, No.23) will continue. The programme on the fate of pesticides and other agrochemicals in soil and water will be completed (Table F.11, No.21), and new programmes on fumigant and pesticide residues in stored grain and the fate of trypanicide drugs used to control sleeping sickness in cattle will be initiated. Reviews will be made of current knowledge on the use of isotopes to study pesticide residues in food and on pesticide residues in stored grain (Table F.12, Nos 12 and 13).

Related activities

F.5.2/4. Four technical co-operation projects and parts of two large-scale projects were serviced during 1981. Laboratory support will continue.

Co-operation with other organizations

F.5.2/5. Co-operation will be maintained with SIDA, GSF, WHO, UNEP and a number of national organizations.

Improving the use of agricultural wastes by means of nuclear techniques (component F.5.3)

Objective

F.5.3/1. The objective is to help improve the utilization of agricultural wastes and recycle them for useful purposes.

Results to date

F.5.3/2. The GSF-funded nitrogen residue programme (Table F.11, No.20) has demonstrated that nitrogen residues are not a serious pollutant in developing countries. A more important problem is the efficient use of nitrogen fertilizers. Preliminary data from another CRP (Table F.11, No.25) indicate that radiation-induced mutations of certain microorganisms will increase the degradation of agricultural wastes into useful products.

Plans for 1983-84

F.5.3/3. The CRPs on agricultural waste utilization (Table F.11, Nos 22 and 25) will continue.

Related activities

F.5.3/4. Three technical co-operation projects were serviced during 1981. Laboratory support will continue.

F.5.3/5. Plans are being developed for assessing the environmental impacts of major changes in agricultural production practices, particularly in regard to deforestation in the Amazon Basin.

Co-operation with other organizations

F.5.3/6. Co-operation with ICIPE, UNEP and GSF is anticipated.

SUB-PROGRAMME F.6

Food preservation

OBJECTIVE

F.6/1. The objective is to assist and advise Member States of the Agency and FAO in connection with the safe and effective use of food irradiation on a practical scale in order to prevent post-harvest losses and various kinds of spoilage of food supplies and commodities, and to achieve, in collaboration with WHO and FAO, general acceptance of the various food irradiation applications in Member States.

PROGRAMME TRENDS FOR 1983-84

F.6/2. The present global energy problem has led to a review of the efficiency of traditional methods of food preservation in terms of their energy consumption. In addition, some established technologies, e.g. curing,

and the use of chemical preservatives and fumigation, are now being questioned with regard to their biological safety, occupational hazards and environmental impact. Food irradiation requires small or negligible inputs of energy and can also replace or drastically reduce the use of additives and fumigants, which pose hazards for consumers as well as for workers in food processing factories.

F.6/3. Increased emphasis in the programme will be placed on the study of the technological and economic feasibility of various food irradiation processes and on their development towards pilot or commercial scale applications.

F.6/4. If there is to be general acceptance of all potential, technologically feasible food irradiation processes, information on the wholesomeness of foods processed by high-dose radiation must be generated by the appropriate institutions in Member States and brought together in co-operation with the Agency, FAO and WHO for future evaluation.

F.6/5. The safe and effective use of food irradiation depends on the existence of adequate technical, technological and economic know-how. Present programmes will be adapted to facilitate the appropriate application of food irradiation on a large scale, with a wider variety of foods, and to further their introduction into international trade.

F.6/6. Training will continue to be provided during 1983 at the International Facility for Food Irradiation Technology (IFFIT) at Wageningen, the Netherlands, in co-operation with participating institutions of Member States of FAO or the Agency. A decision on the future of IFFIT beyond 1983 is expected in 1982.

F.6/7. The RCA Asian Regional Co-operative Project on Food Irradiation (RPFI), devoted to the irradiation preservation of four selected commodities (fishery products, tropical fruits, onions and spices), will be continued.

Food preservation

Summary by programme components

Table F.10

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Technological and economic feasibility of food irradiation	3.4 (0.1)[a]	0.2 (1.1)	269 100	-	60 000	6 900	336 000
Public health acceptance and regulatory aspects of the process of food irradiation	0.7 (0.1)	0.2 (1.0)	53 800	30 000	54 000	3 200	141 000
Linguistic services	-	-	-	-	-	20 000	20 000
Printing and publishing services	-	-	-	-	-	41 000	41 000
Data processing services	-	-	-	-	-	1 000	1 000
Conference and contracts services	-	-	-	-	-	14 000	14 000
TOTAL	4.1 (0.2)	0.4 (2.1)	322 900	30 000	114 000	86 100	553 000

[a] FAO staff in brackets.

Technological and economic feasibility of food irradiation (component F.6.1)

Objective

F.6.1/1. The objective is to collaborate in the implementation of projects for extending the shelf-life of important items (such as fishery products, fruit and vegetables) and in the pilot-scale irradiation of these commodities through the rigorous comparative examination of the technological feasibility, economics, public health effects and energy requirements; to investigate insect disinfestation and decontamination by irradiation aimed at facilitating the international trade in commodities of tropical origin; and to collaborate in the activities of IFFIT and RPFI.

Results to date

F.6.1/2. Food irradiation studies were supported in many developing Member States under a CRP which terminated in 1980. In addition, the programme provided technological data, essential for wholesomeness studies, for the International Project in the Field of Food Irradiation (IFIP, terminated in 1981).

F.6.1/3. Considerable progress with regard to the evaluation of the possibilities of shelf-life extension of selected commodities by irradiation has been made under RCA (Table F.11, No.26).

F.6.1/4. New CRPs on pre-commercial scale irradiation of food and on factors influencing the use of food irradiation processes were started in 1981 (Table F.11, Nos 27 and 29). A further programme was initiated in the same year to study the wider application of irradiation technology and to help facilitate trade in commodities of tropical origin (Table F.11, No.28).

Plans for 1983-84

F.6.1/5. The four CRPs mentioned above (Table F.11, Nos 26-29) will continue, with emphasis on areas showing encouraging commercial prospects.

F.6.1/6. It is expected that RPFI will be expanded (with possible continued support from Japan) to emphasize pilot- and/or semi-commercial scale studies relating to the four selected food items of interest to the region.

F.6.1/7. The Project Management Committee of IFFIT will consider the conditions under which continuation of the Facility would be justified and will submit its recommendations to the sponsoring organizations.

F.6.1/8. Strategies for introducing irradiated foods into markets and in trade will be developed in close co-operation with industry and with a view to the needs of developing Member States (Table F.12, No.14).

F.6.1/9. An FAO/IAEA symposium on food irradiation processing, emphasizing technical and socio-economic aspects of food irradiation processing, will be held in 1984 (Annex II(12) and Table F.12, No.15).

F.6.1/10. As advised by the 1980 Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Foods (JECFI), a Code of Technological Practice for food irradiation processes will be prepared with the assistance of consultants in 1983 (Table F.12, No.16).

Related activities

F.6.1/11. In 1981, technical co-operation projects were operational in seven countries; it is expected that such activities will continue. A training course on food irradiation technology was organized by IFFIT. In 1982 and 1983, training courses will also be organized by IFFIT to cover the public health aspects and the proper application and control of food irradiation.

New developments foreseen for 1985-88

F.6.1/12. It is planned to study a wider variety of foods and agricultural raw materials with a view to their suitability for food irradiation.

Co-operation with other organizations

F.6.1/13. This programme component involves co-operation with UNEP, CEC and CMEA. With the assistance of UNEP, contacts will be created with national environmental protection agencies to co-ordinate activities related to replacing the use of environmentally objectionable chemicals by food and feed irradiation processes. Co-operation with ESNA, the Institute of Food Technologists (IFT) of the USA, and IUPAC is also envisaged.

Public health acceptance and regulatory aspects of the process of food irradiation (component F.6.2)

Objective

F.6.2/1. The objective is: to assist in achieving general acceptance of the food irradiation process; to further good irradiation practice through the Joint FAO/WHO Food Standards Programme; and to assist in the implementation and harmonization of legislative requirements regarding the control of irradiated food and the process of food irradiation (in collaboration with the Legal Division).

Results to date

F.6.2/2. Consideration of the evidence on the wholesomeness of irradiated food obtained from IFIP and the CRP on the wholesomeness of the process of food irradiation (terminated in 1980) led the JECFI to conclude in 1980 that the irradiation of any food up to an average dose of 10 kGy causes no toxicological hazard and hence toxicological testing of foods so treated is no longer required. In 1979, the Codex Alimentarius Commission adopted a Recommended International General Standard for Irradiated Foods and a Recommended International Code of Practice for the Operation of Radiation Facilities for the Treatment of Foods. These documents were amended in 1981 in the light of the 1980 JECFI recommendations and have been sent to the Member States of the Joint FAO/WHO Food Standards Programme for comment.

Plans for 1983-84

F.6.2/3. Collaboration with WHO and with the Codex Alimentarius Commission, mainly through the preparation of documentation, will be continued with the aim of furthering international agreement on the acceptance of irradiated foods and the general acceptability of the food irradiation process.

F.6.2/4. A regional FAO/IAEA seminar on food irradiation to be organized in Latin America in 1983 (Annex I(11) and Table F.12, No.17) will focus on the harmonization of legislative requirements and prospects for practical application of food irradiation in the region.

F.6.2/5. Guidelines for national supervision of irradiation facilities and the food irradiation processes will be prepared in accordance with the Recommended International General Standard for Irradiated Foods for inclusion in the Code of Technological Practice (F.6.1/10).

F.6.2/6. The necessary background documentation on the wholesomeness of the high-dose radiation treatment of foods will be prepared to enable their toxicological evaluation and wholesomeness assessment by a Joint FAO/IAEA/WHO Expert Committee (foreseen in 1985).

Related activities

F.6.2/7. Advice will be given to legislative authorities in developing Member States in their implementation of the regulations for the control of the irradiation process, irradiated foods and their trade (in co-operation with the Agency's Legal Division).

New developments foreseen for 1985-88

F.6.2/8. A toxicological evaluation and wholesomeness assessment of foods treated by high-dose radiation are planned for 1985 by JECFI. Activities will centre on achieving world-wide acceptance of all technologically feasible food irradiation processes.

Co-operation with other organizations

F.6.2/9. Co-operation with WHO and the Codex Alimentarius Commission is an important part of this programme component.

Co-ordinated research programmes

Table F.11

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Isotope techniques in studies of biological nitrogen fixation for the dual purpose of increasing crop production and decreasing nitrogen fertilizer use to conserve the environment	14	7	1978	1984
2. Isotopic tracer-aided studies of the role of herbicides and related chemicals in soil and fertilizer nitrogen management	4	4	1980	1986
3. Nuclear techniques in development of fertilizer and water management practices for multiple cropping systems	12	1	1979	1985
4. Isotope and radiation techniques for efficient water and fertilizer use in semi-arid regions	10	4	1979	1984
5. Nuclear techniques in improving pasture management	This programme has been approved but no contracts have yet been awarded			
6. Use of nuclear techniques for cereal grain protein improvement	9	8	1980	1983
7. Induced mutations for disease resistance in grain legumes	5	1	1979	1984
8. Use of induced mutations for improvement of grain legume production in South East Asia	13	0	1978	1984
9. Evaluation of semi-dwarf cereal mutants for cross-breeding	5	6	1980	1985
10. Improvement of leguminous food crops in Africa and the Near East through induced mutations	6	1	1981	1986
11. Improvement of leguminous and oil seed crops in Latin America through induced mutations	4	2	1981	1986
12. Semi-dwarf mutants for rice improvement in South East Asia	1	0	1981	1986
13. Use of nuclear techniques to improve domestic buffalo production in Asia	12	4	1978	1985
14. Isotope-aided studies on non-protein nitrogen and agro-industrial by-product utilization by ruminants with particular reference to developing countries	10	5	1980	1985
15. Use of nuclear techniques in the study and control of parasitic diseases of farm animals	1	0	1982	1986

Table F.11

Co-ordinated research programmes (cont.)

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
16. Development of sexing mechanisms in fruit flies through manipulation of radiation-induced conditional lethals and other genetic measures	5	0	1981	1984
17. Tsetse fly control or eradication by the sterile male technique	9	4	1970	1985
18. Using radiation and isotopes to develop diets for mass rearing hematophagous insects for sterile insect releases and to study disease transmission by these vectors	This programme has been approved but no contracts have yet been awarded			
19. Use of isotopes in pest management with emphasis on rice insects	10	2	1979	1985
20. Agricultural nitrogen residues with particular reference to their conservation as fertilizers and behaviour as potential pollutants	7	5	1975	1983
21. Isotopic tracer-aided studies of agro-chemical residue-soil biota interactions	5	4	1977	1983
22. Development and application of nuclear techniques for improved utilization of agricultural residues	This programme has been approved but no contracts have yet been awarded			
23. Isotopic tracer-aided studies of unextractable or "bound" pesticide residues in soil, plants and food	6	4	1980	1984
24. Studies of agricultural chemical residues in meat, milk and related products of livestock with the aid of nuclear techniques	2	2	1981	1986
25. Development of improved rural methane production from biomass utilizing nuclear techniques	7	3	1981	1986
26. Asian Regional Co-operative Project on Food Irradiation	13	2	1979	1983
27. Pre-commercial scale radiation treatment of food	10	3	1981	1985
28. Insect disinfestation of food and agricultural products by irradiation	0	2	1981	1986
29. Factors influencing the utilization of the food irradiation process	10	2	1981	1985

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table F.12

No.	Document	Users	Source	Year of issue	Paragraph
1.	IAEA-TECDOC on studies of isotope-aided research on biological nitrogen fixation in plants	FAO and Agency Secretariats; research institutions in Member States	Seminar in 1984	1985	F.1.1/3
2.	Proceedings of a symposium on the use of nuclear techniques in soil physics and irrigation studies	As above	Symposium in 1983	1984	F.1.4/3
3.	IAEA-TECDOC on irrigation water quality and crop water requirements (with special reference to saline and salt-affected soils)	FAO and Agency Secretariats; contract and agreement holders; research institutions in Member States	AG 83/1	1984	F.1.4/4
4.	IAEA-TECDOC on the conservation of water through improved water management practices	As above	AG 84/1	1985	F.1.4/5
5.	IAEA-TECDOC with technical guidelines for plant mutation breeders	Plant breeding institutions	AG 84/2	1985	F.2.1/5
6.	Mutation Breeding Newsletter	As above		Twice yearly	F.2.2/8
7.	Training manual on reproduction in domestic animals and hormone analysis	FAO and Agency Secretariats; contract and agreement holders; research institutions in Member States			F.3.1/4
8.	Report on nuclear techniques in the study of important tropical animal diseases	As above	Consultants	1984	F.3.2/6
9.	IAEA-TECDOC on state-of-art review of tsetse SIT projects	As above	AG 83/2	1984	F.4.1/7
10.	IAEA-TECDOC containing a review of recent research and development on aspects of SIT for tsetse control or eradication	As above	Seminar in 1984	1985	F.4.1/7
11.	IAEA-TECDOC on recent developments in isolating sexes in mass-reared insects	As above	Consultants	1983	F.4.2/5
12.	IAEA-TECDOC on recent developments in the use of isotopes to study pesticide residues in food	As above	AG 83/3	1984	F.5.2/3
13.	IAEA-TECDOC on review of residues in stored grain	As above	AG 84/3	1985	F.5.2/3

Table F.12

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
14.	IAEA-TECDOC on strategies for market testing of irradiated foods with special reference to developing Member States	FAO and Agency Secretariats; contract and agreement holders; food processing and marketing organizations	AG 84/4	1985	F.6.1/8
15.	Proceedings of a symposium on food irradiation processing	FAO and Agency Secretariats; food processing and marketing organizations; public health authorities in Member States	Symposium in 1984	1985	F.6.1/9
16.	Code of Technological Practice for food irradiation processes	Food industry; public health institutions	Consultants	1984	F.6.1/10
17.	IAEA-TECDOC containing guidelines on harmonization of legislative requirements and practical aspects of food irradiation in Latin America	FAO and Agency Secretariats; food processing and marketing organizations; public health authorities in Member States	Seminar in 1983	1984	F.6.2/4

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983		Paragraph
1.	FAO/IAEA Advisory Group on nuclear techniques in studies of the effect of irrigation water quality and crop water requirements with special reference to saline and salt affected soils	F.1.4/4
2.	FAO/IAEA Advisory Group on mass rearing, quality control and field operation procedures relevant to the application of SIT for tsetse control	F.4.1/7
3.	FAO/IAEA Advisory Group on use of isotopes in studies of pesticide residues in food	F.5.2/3

1984		
1.	FAO/IAEA Advisory Group on the use of nuclear techniques in studies of water conservation through improved water management practices	F.1.4/5
2.	FAO/IAEA Advisory Group on mutation breeding technology	F.2.1/5
3.	FAO/IAEA Advisory Group on nuclear techniques in studies of pesticide residues in stored grain	F.5.2/3
4.	FAO/IAEA Advisory Group on strategies for market testing of irradiated food	F.6.1/8

G. LIFE SCIENCES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table G.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	718 740
Consultants	29 902
Temporary assistance	-
Sub-total	748 642
Common staff costs	256 759
Travel	31 586
Meetings	
Conferences, symposia, seminars	93 352
Technical committees, advisory groups	42 556
Representation and hospitality	3 943
Scientific and technical contracts	555 162
Scientific supplies and equipment	452
Common services, supplies and equipment	8 600
Other items of expenditure	-
Transfer of costs:	
Translation and records services	24 877
Printing and publishing services	281 111
Data processing services	6 761
Laboratory services	643 405
Conference and contracts services	42 793
TOTAL	2 739 999

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
800 000	60 000	-	60 000	860 000	936 000	1 011 000
36 300	2 500	3 700	6 200	42 500	37 300	38 500
800	100	8 200	8 300	9 100	300	300
837 100	62 600	11 900	74 500	911 600	973 600	1 049 800
247 800	27 700	-	27 700	275 500	299 900	323 600
39 600	4 400	(3 000)	1 400	41 000	45 300	45 500
68 000	6 000	(22 000)	(16 000)	52 000	75 000	178 000
45 000	5 000	(38 000)	(33 000)	12 000	26 000	56 000
5 200	400	(200)	200	5 400	7 500	7 700
687 000	48 000	-	48 000	735 000	741 000	785 000
4 500	300	(2 800)	(2 500)	2 000	1 600	1 600
4 600	500	-	500	5 100	5 500	6 200
1 200	100	100	200	1 400	1 600	1 600
51 000	4 000	(6 000)	(2 000)	49 000	67 000	56 000
227 000	21 000	16 000	37 000	264 000	273 000	288 000
7 000	1 000	12 000	13 000	20 000	20 000	20 000
599 000	53 000	-	53 000	652 000	711 000	762 000
63 000	6 000	(3 000)	3 000	66 000	75 000	81 000
2 887 000	240 000	(35 000)	205 000	3 092 000	3 323 000	3 662 000

SUMMARY OF MANPOWER

Table G.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	5	4	4	-	4	4	4
P-4	5	6	6	-	6	6	6
P-3	1	1	1	-	1	1	1
Sub-total	12	12	12	-	12	12	12
GS	10	10	10	-	10	10	10
TOTAL	22	22	22	-	22	22	22

CHANGES IN COSTS

G/1. As will be seen from Table G.1 above, it is expected that the cost of this programme will increase by $205 000 as a net result of salary and other price increases of $240 000 partly offset by a programme decrease of $35 000.

G/2. Programme increases are foreseen in respect of consultants' services ($3700), temporary assistance ($8200) and "Other items of expenditure" ($100, for training).

G/3. The programme decrease of $22 000 in respect of conferences, symposia and seminars is attributable to a reduction in the number of meetings planned for 1983 (one symposium and one seminar) as compared with 1982 (one symposium and two seminars). A reduction in the number of Advisory Group and Technical Committee meetings from four in 1982 to two in 1983 is reflected in a programme decrease of $38 000. Programme decreases are foreseen for travel ($3000), hospitality ($200) and scientific supplies and equipment ($2800).

G/4. As regards the allocation of service costs, programme increases are foreseen in respect of printing and publishing services ($16 000) and data processing services ($12 000); these are partly offset by decreases in respect of linguistic services ($6000) and conference and contracts services ($3000).

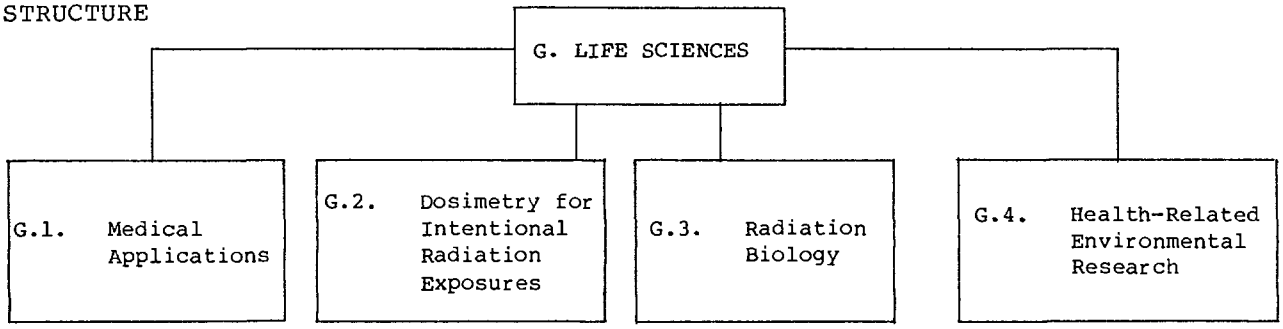
G/5. As can be seen from Table 1 (CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that the United States of America will contribute an amount of $20 000 for activities relating to a spare-part pilot project.

THE PROGRAMME

OBJECTIVE

G/6. The objective is to foster - in close collaboration with other organizations belonging to the United Nations family, especially WHO, to whom it is the Agency's policy to hand over at the appropriate time those activities in the programme which relate to procedures whose application has become routine - the development of techniques for the application of radiation and radionuclides in medicine, biology and health-related environmental research and to promote the use of techniques for improving accuracy and reliability in radiation dosimetry for biomedical and industrial applications.

STRUCTURE



G.1.1. Instrumentation for nuclear medicine in developing countries

G.1.2. Technical improvement of in vitro assay procedures with radioactive agents

G.1.3. Technical improvement of in vivo procedures with isotopic agents

G.1.4. Nuclear techniques for the analysis of elements of biomedical significance

G.2.1. Network of Secondary Standard Dosimetry Laboratories (SSDL Network)

G.2.2. Dose intercomparison development

G.2.3. Dosimetry for industrial radiation processing

G.3.1. Radiation sterilization of medical supplies including pharmaceuticals

G.3.2. Control of parasitic infections of man and of disease vectors by means of nuclear techniques

G.3.3. Application of recent radiobiological research results in radiotherapy

G.3.4. Radiation treatment of domestic wastes

G.3.5. Comparative biological hazards of energy-related chemical pollutants and low-level radiation in the environment

G.4.1. Nuclear techniques for the analysis of mineral elements of bio-environmental importance

G.4.2. Improvement of methodology of epidemiological studies of the health impacts of low-level ionizing radiation

Summary of manpower and costs by sub-programme

Table G.3

Sub-programme	1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Medical applications	3.2	2.2	1 165 000	3.2	2.2	1 179 000	3.2	2.2	1 393 000
Dosimetry for intentional radiation exposures	3.3	4.3	930 000	3.3	4.3	1 018 000	3.3	4.3	1 107 000
Radiation biology	3.3	2.3	719 000	3.3	2.3	812 000	3.3	2.3	823 000
Health-related environmental research	2.2	1.2	278 000	2.2	1.2	314 000	2.2	1.2	339 000
TOTAL	12.0	10.0	3 092 000	12.0	10.0	3 323 000	12.0	10.0	3 662 000

SUB-PROGRAMME G.1

Medical applications

OBJECTIVE

G.1/1. The objective is to provide advice and assistance to Member States, particularly developing Member States, in acquiring and improving techniques appropriate to the use of radionuclides in preventive and clinical medicine and in medical research and, in collaboration with WHO, to promote their effective use in applications of local importance.

PROGRAMME TRENDS FOR 1983-84

G.1/2. The use of isotopic techniques for medical diagnosis and research continues to expand in developing Member States, although the medical problems and the conditions under which the instruments are used are rather different from those in countries where these techniques originated. The emphasis under this sub-programme will be on upgrading the quality of nuclear medicine work in developing countries through improved maintenance of instruments, quality control in *in vitro* assay procedures, quality control of nuclear medicine instruments used for *in vivo* investigations, and quality control in nuclear techniques for the analysis of elements of biomedical significance. Attention will also be given to the problem of selecting suitable instruments and to the identification of techniques having special significance in developing Member States.

Medical applications

Summary by programme components

Table G.4

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Instrumentation for nuclear medicine in developing countries	0.4	0.6	57 600	-	48 500	6 900	113 000
Technical improvement of *in vitro* assay procedures with radioactive agents	1.3	0.5	117 800	-	70 000	3 200	191 000
Technical improvement of *in vivo* procedures with isotopic agents	1.3	0.6	122 400	-	70 000	2 600	195 000
Nuclear techniques for the analysis of elements of biomedical significance	0.2	0.5	29 800	-	70 000	4 200	104 000
Linguistic services	-	-	-	-	-	14 000	14 000
Printing and publishing services	-	-	-	-	-	98 000	98 000
Data processing services	-	-	-	-	-	8 000	8 000
Laboratory services	-	-	-	-	-	425 000	425 000
Conference and contracts services	-	-	-	-	-	17 000	17 000
TOTAL	3.2	2.2	327 600	-	258 500	578 900	1 165 000

Instrumentation for nuclear medicine in developing countries (component G.1.1)

Objective

G.1.1/1. The objective is to promote the development and selection of instruments and software better suited to the tasks involved and the conditions of use in developing countries, and to assist in improved instrument maintenance.

Results to date

G.1.1/2. A prototype automatic well scintillation counter appropriate to conditions of use in developing Member States has been designed and tested, and commercial production promoted.

G.1.1/3. Software has been developed for a programmable calculator suitable for use, on line (with the above counter) or off line, in the analysis of *in vitro* assay data. It has been documented and made available, along with the calculator, for routine use under research contracts in over 50 laboratories.

G.1.1/4. Surveys of the state of maintenance of nuclear medicine instruments in about 200 laboratories in 25 Member States in Asia and the Pacific, Africa and Latin America have been completed under various CRPs.

G.1.1/5. Improved maintenance strategies and electrical power conditioning have been introduced under CRPs (Table G.8, Nos 1 and 2) involving 35 laboratories in 13 Member States in Asia and the Pacific (under RCA) and in Latin America.

G.1.1/6. A spare-part pilot project is being established in 1982 (using funds made available for this purpose by a Member State) to facilitate the supply of urgently required spare parts to laboratories participating in these CRPs and to stimulate the development of an effective policy for the acquisition of spare parts.

G.1.1/7. A seminar on the maintenance of nuclear instruments was organized in 1980 for the Asia and Pacific region.

Plans for 1983-84

G.1.1/8. The CRPs (Table G.8, Nos 1 and 2) and spare-part pilot project will be continued. On the basis of the experience gained, recommendations will be drawn up on electrical power conditioning and overall maintenance strategies in laboratories of developing Member States (Table G.9, Nos 1 and 2).

G.1.1/9. Software for *in vitro* assays will be developed further and the resultant programs will be published (Table G.9, No.3). Guidance as to development, selection, or exchange of software in connection with other nuclear medicine procedures will be drawn up with the help of consultants.

Related activities

G.1.1/10. An interregional technical co-operation project on the maintenance of nuclear instruments in 8 Member States in Africa, 11 in Asia and the Pacific, and 9 in Latin America was initiated in 1981, and 3 further national projects were serviced.

G.1.1/11. One regional and three national courses for electronics technicians, and one regional workshop to train teachers of electronics technicians were supported in 1981.

New developments foreseen for 1985-88

G.1.1/12. The trend of this component is toward local capability in maintenance and in software development and exchange.

Co-operation with other organizations

G.1.1/13. There will be increased collaboration with UNIDO and WHO.

Technical improvement of in vitro assay procedures with radioactive agents (component G.1.2)

Objective

G.1.2/1. The objective is: to stimulate the introduction of sound quality control in routine assays; to assess and improve the reliability and usefulness of selected procedures under the conditions found in developing Member States; and to promote, in collaboration with WHO, the application of such procedures to the solution of health problems of importance in developing Member States.

Results to date

G.1.2/2. Over 100 research contracts and agreements were active during the period 1978-81. Three CRPs have been completed since 1978 on: in vitro assay techniques; in vitro assay procedures in studies of reproductive physiology; and quality control of in vitro assay techniques for the measurement of thyroid-related hormones. Plans for four further programmes have been drawn up: (1) external quality assessment of in vitro assays; (2) internal quality control of in vitro assays; (3) the cost-effectiveness analysis of radionuclide diagnostic tests of the thyroid function; and (4) the development, validation, and testing of more "rugged" in vitro assay procedures and materials as relevant to laboratories in developing Member States.

G.1.2/3. The fourth in a series of symposia on radioimmunoassay and related procedures in medicine is being held in 1982.

G.1.2/4. Prototype simple automatic sample counters for in vitro assay have been made available for tests in 14 laboratories, with generally encouraging results.

Plans for 1983-84

G.1.2/5. The four new CRPs initiated in 1982 (see G.1.2/2) will continue.

G.1.2/6. A seminar on quality control in radioimmunoassay is to be held in 1984 for the Asia and Pacific region (Annex II(13)).

Related activities

G.1.2/7. The development of prototype simple automatic gamma counters (G.1.1/2) and calculator programs for processing data acquired in in vitro assays (G.1.1/3) relates directly to this component.

G.1.2/8. During 1981, approximately 25 technical co-operation projects concerned entirely or mainly with in vitro assay were serviced. A similar level of activity is expected in this field in the next biennium.

G.1.2/9. A training course was held in 1982.

New developments foreseen for 1985-88

G.1.2/10. It is likely that increased effort will be required to assess the selective merits of competing procedures based on isotopic and non-isotopic labels.

Co-operation with other organizations

G.1.2/11. Collaboration will be maintained with WHO, especially with regard to quality control of in vitro assays.

Technical improvement of in vivo procedures with isotopic agents (component G.1.3)

Objective

G.1.3/1. The objective is to stimulate the introduction of sound quality control in routine procedures; to assess and improve the reliability and usefulness of selected procedures under the conditions found in developing Member States; and to promote, in collaboration with WHO, the application of such procedures to the solution of health problems of importance in developing Member States.

Results to date

G.1.3/2. Twelve research contracts and agreements were active during the period 1978-81 on various in vivo diagnostic applications of radionuclides.

G.1.3/3. The sixth in a series of symposia on medical radionuclide imaging took place in 1980.

G.1.3/4. Protocols for routinely testing the performance of instruments used for in vivo nuclear medicine were formulated in 1981. A seminar on quality assurance in the use of nuclear medicine instruments was organized in South America in 1981, and a second in Asia in 1982.

G.1.3/5. A report on stable isotopes in the life sciences, prepared jointly with CMEA, was published in 1977. A CRP on the use of stable isotopes to study selected aspects of malnutrition was initiated in 1982.

Plans for 1983-84

G.1.3/6. Protocols developed for the routine testing of nuclear medicine instruments will be published (Table G.9, No.4).

G.1.3/7. A CRP on applications of stable isotopes in the study of selected aspects of malnutrition (G.1.3/5) will be continued.

G.1.3/8. Two new CRPs will be started in 1983 on: the cost-effectiveness analysis of alternative radionuclide diagnostic tests of the liver, and the development and testing of radiopharmaceuticals of special interest in developing Member States (the latter in collaboration with the "Industrial applications and chemistry" sub-programme of the "Physical Sciences" programme).

Related activities

G.1.3/9. During 1981, approximately 20 technical co-operation projects concerned entirely or mainly with in vivo applications of radionuclides were serviced.

G.1.3/10. A training course on the medical applications of radionuclides was supported in a Member State in 1981.

New developments foreseen for 1985-88

G.1.3/11. Gamma cameras will soon become the dominant instruments for in vivo nuclear medicine investigations in developing Member States as they have been for several years in developed countries. This is likely to increase the demand for support from the Agency.

Co-operation with other organizations

G.1.3/12. Collaboration will be continued in all aspects of this programme component with WHO.

Nuclear techniques for the analysis of elements of biomedical significance (component G.1.4)

Objective

G.1.4/1. The objective is to stimulate the improvement of nuclear-based techniques (especially activation analysis with nuclear research reactors) for the assay of trace substances of biomedical significance; to intercompare such techniques; and to promote, in collaboration with WHO, the application of such techniques to the solution of health problems distinctively associated with local environments.

Results to date

G.1.4/2. A total of 19 research contracts and agreements were active during the period 1978-81. Two related CRPs - both conducted jointly with WHO - have been completed since 1978: the association of tissue trace elements with cardiovascular disease; and the applicability of nuclear-based techniques in studies of trace elements in nutrition (especially in human milk). A new CRP, initiated in 1982, involves nuclear-based techniques in certain problems of occupational health.

G.1.4/3. Analytical quality control materials of various kinds have been prepared and used for interlaboratory comparisons (see paragraph I.2.2/3).

G.1.4/4. A symposium on nuclear activation techniques in the life sciences (third in a series) was held in 1978 in collaboration with the "Health-related environmental research" sub-programme. A technical document on nuclear-based techniques for the in vivo study of human body composition, incorporating a directory of existing facilities for in vivo neutron activation analysis and X-ray fluorescence spectrometry, was published in 1982.

G.1.4/5. Technical reports have been prepared on: (1) the comparison of nuclear and non-nuclear techniques for the determination of trace elements in biological materials (published 1980); and (2) the elemental composition of human and animal milk as determined by activation analysis and other trace analysis techniques (published 1982).

Plans for 1983-84

G.1.4/6. A CRP on trace substances in occupational health (G.1.4/2) will continue. A new programme in collaboration with WHO and other international bodies will be initiated in 1983 for the purpose of making an international comparative study of daily dietary intakes of essential and toxic mineral elements.

G.1.4/7. In 1983, an evaluation will be initiated with the aid of consultants of the applicability of short-lived isotopes in the analysis of materials of biomedical interest.

G.1.4/8. In collaboration with the "Health-related environmental research" sub-programme, a new CRP on the effects of certain human infectious diseases on the status of specific trace elements will be started.

G.1.4/9. The results of an intercomparison of minor and trace elements in horse kidney will be published (Table G.9, No.5).

Related activities

G.1.4/10. Many of the activities mentioned above are supported by work in the Laboratory. Close co-operation is also maintained with the "Health-related environmental research" sub-programme.

New developments foreseen for 1985-88

G.1.4/11. A new project on the modifying role of trace elements in relation to environmental carcinogens may be started during this period in collaboration with the IARC.

Co-operation with other organizations

G.1.4/12. Close collaboration will be maintained with WHO, particularly in respect to research activities that have already been formally established as joint programmes. Contact will be established with other organizations, such as FAO, IARC and UNEP, where appropriate.

SUB-PROGRAMME G.2

Dosimetry for intentional radiation exposures

OBJECTIVE

G.2/1. The objective is to provide services and promote standardization, mainly through the IAEA/WHO Network of Secondary Standard Dosimetry Laboratories (SSDLs), with the aim of improving the accuracy and reliability of dosimetric measurements in biomedical and industrial radiation applications.

PROGRAMME TRENDS FOR 1983-84

G.2/2. Public concern about all aspects of radiation safety, related to the production of energy as well as to intentional radiation applications, has caused renewed strong demand for accurate and reliable radiation dosimetry. This demand has led to the establishment of Secondary Standard Dosimetry Laboratories in 30 developing Member States. In the period 1983-84, support for the setting-up of SSDLs in developing Member States and their integration into the international measurement system will be continued; it is expected that a further 3-5 laboratories will join the Network in this period.

G.2/3. Postal dose intercomparison services for radiotherapy have been taken over by some advanced SSDLs for their respective countries. The IAEA/WHO Postal Dose Intercomparison Service will be continued for those countries where such services are needed but local SSDL services are not yet available.

G.2/4. In the period 1983-84, emphasis will be given to the completion of the various high-dose intercomparison studies carried out between 1977-82. The results will be used for international recommendations and the international high-dose assurance service.

Dosimetry for intentional radiation exposures

Summary by programme components

Table G.5

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Network of Secondary Standard Dosimetry Laboratories (SSDL Network)	0.7	1.4	92 600	30 000	44 800	7 600	175 000
Dose intercomparison development	1.4	2.3	177 500	-	50 000	6 500	234 000
Dosimetry for industrial radiation processing	1.2	0.6	104 800	-	50 000	3 200	158 000
Linguistic services	-	-	-	-	-	14 000	14 000
Printing and publishing services	-	-	-	-	-	95 000	95 000
Data processing services	-	-	-	-	-	10 000	10 000
Laboratory services	-	-	-	-	-	227 000	227 000
Conference and contracts services	-	-	-	-	-	17 000	17 000
TOTAL	3.3	4.3	374 900	30 000	144 800	380 300	930 000

Network of Secondary Standard Dosimetry Laboratories (SSDL Network) (component G.2.1)

Objective

G.2.1/1. The objective is to operate the technical secretariat of the IAEA/WHO Network of SSDLs by: assisting developing Member States in the planning, setting-up and operation of SSDLs; assisting SSDLs in applying standardized dosimetry techniques; ensuring access to primary dosimetry standards; and organizing dose intercomparisons among SSDLs and radiotherapy institutes.

Results to date

G.2.1/2. The IAEA/WHO Network of SSDLs currently comprises 43 member laboratories, located mainly in developing Member States. It is actively supported by 12 affiliated national standards laboratories and 5 collaborating international bodies, including the BIPM, the ICRU and OIML.

G.2.1/3. Twenty-four SSDLs are already in full operation, another eight are reported to be partly operative; eleven are in various stages of development. They fulfil tasks in the fields of dosimetry standardization, instrument calibration and instrument verification in their respective countries.

G.2.1/4. In its function as the central laboratory of the SSDL Network, the Agency's Dosimetry Laboratory has conducted three dose intercomparisons among selected SSDLs.

G.2.1/5. Dose calibration comparisons by visiting experts have been undertaken since 1980 at SSDLs in Africa, East Europe/Near East and Latin America, covering 5 to 7 SSDLs per region.

G.2.1/6. Two documents for SSDLs have been completed: a manual on neutron measurements and a manual on radioactivity measurements. The WHO SSDL secretariat has been assisted in the compilation of the "SSDL Circular Letter".

G.2.1/7. A statistical evaluation of the results obtained in the joint IAEA/WHO postal dose intercomparisons for cobalt-60 in radiotherapy institutes in the period 1975-80 was completed in 1982.

Plans for 1983-84

G.2.1/8. The Agency will continue to operate the technical secretariat of the SSDL Network and to give advice concerning the design, equipment and operation of SSDLs. All technical activities related to the SSDL Network and the operation of individual SSDLs will continue to be guided by the IAEA/WHO SSDL Advisory Group.

G.2.1/9. In 1976, the Agency and WHO agreed to promote the SSDL Network until it becomes self-sustaining without further need for support by the two organizations. In the light of this agreement a thorough assessment concerning the state of development of the Network and its need for future support by the Agency will be undertaken jointly with WHO (Table G.9, No.6).

G.2.1/10. Postal dose intercomparisons for radiotherapy and radiation protection purposes among selected SSDLs will be performed once or twice a year. Results of these experiences will be published in the "SSDL Circular Letter".

G.2.1/11. Compilation of a new directory of high-energy radiotherapy centres will be completed (Table G.9, No.7).

G.2.1/12. A seminar on calibration procedures in SSDLs will be held in 1983 (Annex I (12)) and a regional training course for SSDL staff will be held in 1984.

G.2.1/13. If need should arise, further guidelines for SSDLs on specific topics, such as standardized procedures for quality control of dosimetry instrumentation, will be prepared.

G.2.1/14. The methodology and practice of postal dose intercomparisons will be reviewed (Table G.9, No.8).

G.2.1/15. The largest source of exposure of the population to man-made ionizing radiation is diagnostic radiology. As a first step towards reducing these exposures it is proposed to survey the levels of doses received during typical diagnostic procedures. Such studies will be initiated in 1983 within the framework of a new CRP on quality assurance for radio-diagnostic procedures.

G.2.1/16. A CRP designed to develop and test a stable and high-precision dosimetry transfer standard for SSDL intercomparisons will be started in 1983.

Related activities

G.2.1/17. Dose calibration comparisons by visiting experts will be continued at a rate of about 10 to 12 SSDLs per year within an interregional technical co-operation project.

G.2.1/18. Support within the framework of the technical co-operation programme is being given to SSDLs in 20 Member States. A training course for technical SSDL staff was conducted in 1981 in co-operation with WHO and GSF. Individual laboratory training was given to three SSDL staff at the Agency's Dosimetry Laboratory in 1981 and 1982.

G.2.1/19. Technical contracts with at least one national standards laboratory and ICRU, to obtain calibrations of the Agency's secondary standard dosimeters and to maintain the necessary link between the SSDL Network and the primary measurement system, will continue. A small number of technical contracts will be awarded to standards laboratories with the objective of designing prototypes of carbon and water calorimeters for use in advanced SSDLs.

Co-operation with other organizations

G.2.1/20. The SSDL Network is a joint IAEA/WHO undertaking. It also involves co-operation with ICRU, OIML, BIPM and several national standards laboratories serving as affiliated members in the Network.

Dose intercomparison development (component G.2.2)

Objective

G.2.2/1. The objective is to develop and test new instrumentation and procedures that will improve and extend the dose intercomparison procedures to be used at SSDLs and the Agency's Dosimetry Laboratory.

Results to date

G.2.2/2. Special equipment not available on the market has been developed for use in SSDLs (see I.2.3/4 and 5).

Plans for 1983-84

G.2.2/3. Under a technical contract with the Österreichische Studiengesellschaft für Atomenergie, an absorbed dose calorimeter intended to serve as a prototype for use in advanced SSDLs will be designed. A document on the design and function of the Agency's Dosimetry Laboratory will be published in 1983 (Table G.9, No.9) to serve as a guide for the planning of SSDLs.

G.2.2/4. Advances in the dosimetry of heavy charged particles in radiotherapy will be reviewed (Table G.9, No.10).

Related activities

G.2.2/5. Intercomparison services are performed by the Dosimetry Laboratory (see component I.2.3).

Co-operation with other organizations

G.2.2/6. Within the framework of the technical contracts programme, close co-operation will be maintained with the Hungarian National Office of Measures and the Österreichisches Forschungszentrum Seibersdorf.

Dosimetry for industrial radiation processing (component G.2.3)

Objective

G.2.3/1. The objective is to implement a dose assurance service for industrial radiation processing facilities in the dose range 10 Gy (1 krad) to 100 kGy (10 Mrad). The service is intended to facilitate international trade in irradiated materials, especially those relevant to the health and nutrition of man.

Results to date

G.2.3/2. Since 1977, seven preliminary intercomparisons have been carried out and dosimeter studies under extreme environmental conditions performed. Out of five dosimeter systems, one was recommended for use with the dose assurance service in the upper part of the dose range while the others were declared useful as back-up or checking systems.

G.2.3/3. In 1982, an arrangement is to be made with GSF to supply dosimeters. Twenty irradiation facilities are to be asked to irradiate the dosimeter system (upper dose range). The distribution of the dosimeters and collation of data are to be organized by the Agency.

G.2.3/4. In 1982, four different dosimeters were evaluated as back-up systems for the dose assurance service in the lower part of the dose range (10 Gy - 10 kGy); three irradiation facilities participated in this study.

G.2.3/5. An intercomparison of 10-MeV electron beams at three national laboratories was made using graphite and water calorimeters.

G.2.3/6. A seminar on high-dose dosimetry in industrial radiation processing is being held in 1982 in Risø, Denmark.

Plans for 1983-84

G.2.3/7. An evaluation of the results of the pilot dose assurance service (G.2.3/3) will be made prior to offering this service to commercial irradiators. Recommendations on high-dose intercomparisons will be drawn up (Table G.9, No.11).

G.2.3/8. As an extension of the electron-beam programme, further intercomparisons will be made in 1983 and 1984 with 10-MeV beams and also with 0.15-5 MeV beams having well-defined characteristics. The results will be evaluated with the help of consultants.

G.2.3/9. The CRP on high-dose standardization and intercomparison for industrial radiation processing (Table G.8, No.3) will continue (Table G.9, No.12).

G.2.3/10. An international symposium on high-dose dosimetry for radiation processing will be organized in 1984 (Annex II (14) and Table G.9, No.13).

New developments foreseen for 1985-88

G.2.3/11. It is envisaged that the electron-beam intercomparison programme will give results which will permit the initiation of a pilot dose assurance service for electron-beam irradiators.

SUB-PROGRAMME G.3

Radiation biology

OBJECTIVE

G.3/1. The objective is to advise and assist Member States in connection with the sterilization of medical supplies and pharmaceuticals, the control of parasitic diseases, cancer therapy, the treatment of domestic wastes and the evaluation of hazards due to environmental pollutants.

PROGRAMME TRENDS FOR 1983-84

G.3/2. There is a growing need for extending collaboration with developing countries in the use of nuclear methods and ionizing radiation to improve human health and the rational utilization of resources.

G.3/3. Programme activities concerned with the sterilization of medical products will be shifted to Africa and the Middle East. The programme on radiobiological aspects of the disinfection of domestic sewage will be re-oriented to meet the requirements of developing countries. Work on cancer radiotherapy will concentrate on the practical application of modifying agents.

G.3/4. The programme related to the use of nuclear techniques in the preparation of vaccines against specific human diseases will now be concerned with an evaluation of the pathological consequences of vaccination. Support and co-ordination activities for research on the evaluation of the carcinogenic and mutagenic health impacts of pollutants from energy sources will continue.

Radiation biology

Summary by programme components

Table G.6

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Radiation sterilization of medical supplies including pharmaceuticals	0.3	0.2	32 200	2 000	24 500	2 300	61 000
Control of parasitic infections of man and of disease vectors by means of nuclear techniques	1.0	0.7	101 500	-	90 000	2 500	194 000
Application of recent radio-biological research results in radiotherapy	1.0	0.6	95 700	32 000	68 000	6 300	202 000
Radiation treament of domestic wastes	0.2	0.2	22 900	-	25 500	1 600	50 000
Comparative biological hazards of energy-related chemical pollutants and low-level radiation in the environment	0.8	0.6	82 200	-	24 500	300	107 000
Linguistic services	-	-	-	-	-	14 000	14 000
Printing and publishing services	-	-	-	-	-	65 000	65 000
Conference and contracts services	-	-	-	-	-	26 000	26 000
TOTAL	3.3	2.3	334 500	34 000	232 500	118 000	719 000

Radiation sterilization of medical supplies including pharmaceuticals (component G.3.1)

Objective

G.3.1/1. The objective is to assist Member States in the development of radiation sterilization practices to suit the needs and safe clinical application of local medical products including pharmaceuticals and tissue grafts in the Member States of Asia, the Middle East and Africa, with special emphasis on the necessary control of the radiation response criteria of their constituent substances and their microbial bioburden.

Results to date

G.3.1/2. Research carried out within a CRP under the RCA, has helped in the develoment of a safe radiation sterilization practice for a number of locally manufactured medical items, in the standardization of the dosimetry practices for irradiator facilities and in the formulation of a comprehensive protocol to aid operational procedure. In India, the results have led to the development of clinically safe criteria and practices for the radiation sterilization of some eye ointment formulations. In Pakistan, a dye-based colour change film monitor-dosimeter has been developed from indigenous ingredients for routine use in the monitoring of the irradiation process for medical supplies.

G.3.1/3. A joint WHO/IAEA Working Group meeting is being held in India (1982) to survey the specific needs of the Member States in the Asian region in connection with the establishment of local irradiated tissue banking services.

Plans for 1983-84

G.3.1/4. A new CRP on the radiation sterilization of tissue grafts for rehabilitative surgery will be initiated under the RCA in 1983.

C.3.1/5. A seminar on tissue banks for radiation sterilized grafts will be held in 1984 (Annex II (15)) to consider the adaptation of existing techniques to local conditions in developing countries in Asia.

G.3.1/6. Work on the promotion of radiation sterilization practices suitable for local medical supplies in Africa and the Middle East to help upgrade the standard of health care services in the region will be supported through a CRP to be started in 1983. The international recommendations on the radiation sterilization of medical supplies will be updated in the light of the recent findings reported in the 1980 document of the Association for the Advancement of Medical Industries (AAMI) and the operational experiences gained by Member States (Table G.9, No.14).

Related activities

G.3.1/7. About 30 applications for fellowships, scientific visits and experts advisory services were evaluated in 1981 from Member States in the Far East and Africa (Burma, Egypt, Ghana and Indonesia) in connection with the operation of newly installed irradiator facilities and/or the pre-investment planning of national programmes.

Co-operation with other organizations

G.3.1/8. Co-operation with WHO in the development and standardization of radiation sterilization practices and the training of technical manpower will be strengthened.

Control of parasitic infections of man and of disease vectors by means of nuclear techniques (component G.3.2)

Objective

G.3.2/1. The objectives are to investigate the pathological and immunological consequences of the application of irradiated vaccines for malaria and schistosomiasis; to develop radiometric techniques for monitoring antigens in body fluids for the epidemiology and diagnosis of specific parasitic infections; and, in collaboration with the Joint FAO/IAEA Division, to develop a control programme for mosquito vectors based on the application of the sterile-insect technique.

Results to date

G.3.2/2. A symposium on nuclear techniques in the study and control of parasitic diseases of man and animals was held in 1981. Research carried out under a CRP on the preparation of irradiated vaccines for some human diseases (Table G.8, No.4) has shown that such vaccines can increase resistance to subsequent infections with malaria and schistosomiasis and decrease the morbidity resulting from such infections. A new programme was initiated in 1982 to determine the pathological consequences and immunological bases of the application of irradiated vaccines for the control of malaria and schistosomiasis, with special emphasis on investigations in primate model systems.

G.3.2/3. The current developments in monoclonal antibody and genetic engineering techniques make it potentially feasible to detect parasite antigens in host body fluids. A new CRP was initiated during 1982 to develop radiometric tests and radiation-immobilized antibody techniques for use in seroepidemiology and in the specific diagnosis of current infections.

G.3.2/4. Another CRP was started in 1982 in collaboration with the Joint FAO/IAEA Division to study the radiation biology of mosquitoes and the feasibility of applying the SIT for the field control of mosquito vectors.

Plans for 1983-84

G.3.2/5. The CRP on the pathological consequences and immunological bases of irradiated vaccines will continue, with emphasis on the study of the long-term consequences of multiple vaccinations.

G.3.2/6. The new CRPs on nuclear techniques for detecting parasite antigens in body fluids and the feasibility of using the SIT for the control of mosquito vectors will continue.

G.3.2/7. The use of radiometric and other nuclear techniques for the detection of antigens in body fluids will be reviewed (Table G.9, No.15).

Co-operation with other organizations

G.3.2/8. This programme component involves co-operation with FAO, UNEP and WHO.

Application of recent radiobiological research results in radiotherapy (component G.3.3)

Objective

G.3.3/1. The objective is to review the results of recent radiobiological research on radiation therapy by high-LET (Linear Energy Transfer) radiation as well as conventional radiation combined with other techniques, and to develop methods for exploring their practical application.

Results to date

G.3.3/2. The use of high-LET radiation from external and internal sources in cancer therapy was reviewed in 1977 and 1979 and a CRP on high-LET radiation in cancer therapy was started in 1980 (Table G.8, No.5).

G.3.3/3. At a seminar held in 1981 on prospective methods of radiotherapy for developing countries, it was shown that combined treatment with radiation and some suitable chemical or physical modifiers and brachytherapy is potentially useful, and these techniques are being transferred to developing Member States. The lectures given at the seminar were published in 1982.

G.3.3/4. Research under the CRP on improvements of cancer radiation therapy using modifiers of radiosensitivity (which was completed in 1981) showed that several radiosensitizers are effective in improving the therapeutic gain. A new programme on clinical practice for the improvement of radiotherapy in developing Member States was started in 1982.

Plans for 1983-84

G.3.3/5. A symposium to review the biological effects of low-dose radiation with particular regard to stochastic and non-stochastic effects will be held in 1983 in co-operation with WHO (Annex I (13), Table G.9, No.16).

G.3.3/6. The current status of corpuscular radiation in non-conventional cancer therapy will be reviewed by consultants (Table G.9, No.17).

G.3.3/7. The CRP on clinical practices for the improvement of radiotherapy (Table G.8, No.5) will continue.

G.3.3/8. Fellowship training will be supported and expert advice given on the improvement of radiotherapy in developing Member States.

G.3.3/9. A training course on new techniques for improving radiotherapy will be held in 1984 for medical physicists and doctors in Asian Member States.

New developments foreseen for 1985-88

G.3.3/10. Work on improvements in radiotherapy practice will be expanded to include diagnostic methods using nuclear and computer techniques.

Radiation treatment of domestic wastes (component G.3.4)

Objective

G.3.4/1. The objective is to determine optimum conditions for the radiation treatment of domestic wastes for safe re-utilization, with emphasis on radiobiological aspects of decontamination from pathogenic microorganisms.

Results to date

G.3.4/2. Reviews were made in 1977 of the experience of Member States, mainly in North America and Europe, in applying nuclear techniques for the development of efficient and safe re-utilization practices for domestic sewage, and in 1981 of the use of radiation treatment for domestic wastes in the particular context of developing Member States.

Plans for 1983-84

G.3.4/3. A CRP will be started in 1983 to promote the collection of data on the organic and inorganic composition of sewage and to demonstrate the importance of dose rate and radiation energy in the treatment of sewage, with special reference to conditions in developing Member States.

New developments foreseen for 1985-88

G.3.4/4. The emphasis of the programme will be shifted during 1987-88 towards the transfer of nuclear technology suiting the conditions and economic needs of developing Member States.

Co-operation with other organizations

G.3.4/5. The necessary co-operation with the relevant programme activities of WHO, FAO, UNEP and ESNA will be maintained.

Comparative biological hazards of energy-related chemical pollutants and low-level radiation in the environment (component G.3.5)

Objective

G.3.5/1. The objective is to contribute towards the development of a methodology and the derivation of a quantitative dose-effect relation for comparing the potential biological hazards to human health caused by low-level radiation and chemical pollutants released from generating plants using nuclear and conventional (especially fossil fuel) sources of energy.

Results to date

G.3.5/2. The methods and criteria for evaluating the biological effects of low-level radiation and the extrapolation of the results from animal experiments to humans were reviewed at a symposium in 1978.

G.3.5/3. The available information on the biological implications of radionuclides (especially transuranics and tritium) which might be released from present and future nuclear facilities was considered at another symposium in 1979.

G.3.5/4. A standardized cytogenetic protocol to facilitate reliable assessment of absorbed low-LET radiation doses (including very low dose levels) was developed under a CRP in conjunction with the "Nuclear Safety" programme on induced chromosomal aberration frequencies in human peripheral blood lymphocytes. The results are being used for the monitoring of personnel at nuclear installations. The research programme also provided data on the dose-response at low dose levels of high-LET radiation to serve as a basis for assessing health risks from exposures to radiations of different qualities.

G.3.5/5. A symposium on the health impacts of different sources of energy, jointly organized by WHO, UNEP and the Agency (1981), reviewed the current methodological approaches followed in the health risk evaluation of chemical and physical pollutants from the development and use of different energy sources.

G.3.5/6. A number of biological test systems based on the detection of mutagenic and carcinogenic effects of specific pollutants from energy sources have been developed under a CRP on the comparative biological hazards of energy-related chemical pollutants and low-level radiation in the environment (Table G.8, No.6). A Technical Report published in 1980 detailed some of these test systems and the methods for equating chemical effects to damage due to radiation.

Plans for 1983-84

G.3.5/7. The co-ordinated research on radiobiological and related test systems using somatic, genetic and cytogenetic effects for assessment of the relative hazards of radioactive and chemical pollutants from alternative energy sources (Table G.8, No.6) will be completed and a new programme on the improvement of the methods for quantitative dose-response studies on energy-related chemical pollutants will be started.

Related activities

G.3.5/8. Fellowship training on the development of biological test systems involving genetic, cytogenetic and carcinogenic end points has been evaluated.

Co-operation with other organizations

G.3.5/9. Close co-operation with UNEP and WHO will continue.

SUB-PROGRAMME G.4

Health-related environmental research

OBJECTIVE

G.4/1. The objective is to promote the application of nuclear methods for assessing the contamination of man by environmental pollutants and to elaborate methodological approaches for comparing, in the course of epidemiological studies, the impacts on man's health of low-level ionizing radiation and other harmful environmental factors.

PROGRAMME TRENDS FOR 1983-84

G.4/2. There is great concern in practically all countries about the increase of environmental pollution from industrial and agricultural substances, and the harmful impact of this on human health. Programme activities will concentrate on the improvement of nuclear techniques for environmental health studies, especially for countries party to the RCA project, and the provision of a quality control service aimed at increasing the accuracy of measurements. Elaboration of a unified methodology for epidemiological studies of the harmful action of low-level ionizing radiation on radiation workers and for the verification of existing methods of epidemiological studies on the general population will continue.

Health-related environmental research

Summary by programme component

Table G.7

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Nuclear techniques for the analysis of mineral elements of bio-environmental importance	1.0	0.6	69 600	-	79 200	5 200	154 000
Improvement of methodology of epidemiological studies of the health impacts of low-level ionizing radiation	1.2	0.6	80 500	-	20 000	2 500	103 000
Linguistic services	-	-	-	-	-	7 000	7 000
Printing and publishing services	-	-	-	-	-	6 000	6 000
Data processing services	-	-	-	-	-	2 000	2 000
Conference and contracts services	-	-	-	-	-	6 000	6 000
TOTAL	2.2	1.2	150 100	-	99 200	28 700	278 000

Nuclear techniques for the analysis of mineral elements of bio-environmental importance (component G.4.1)

Objective

G.4.1/1. The objective is to assist with research on the applications of nuclear techniques for environmental health studies, in particular assessing community exposure to environmental mineral substances and investigating associated health problems; and to provide quality control services aimed at improving the accuracy and reliability of analytical measurements.

Results to date

G.4.1/2. Nuclear methods for hair elemental analysis as a means of assessing human exposure to environmental mineral pollutants were developed under a CRP concluded in 1979. The methods included activation by thermal and fast neutrons, photons and charged particles. The results obtained under this programme indicate that the mineral composition of hair is a good measure of community exposure to environmental inorganic pollutants and, in specific cases, of individual contamination with such pollutants.

G.4.1/3. The use of accelerator-based techniques, especially (p,X) analysis, for the analysis of trace elements in man was reviewed in 1978.

G.4.1/4. A revised report on hair mineral analysis was issued in 1978. An analytical quality control material based on powdered scalp hair was made available to various analytical laboratories in Member States for an intercomparison study of trace and other mineral elements. A report on the study was prepared in 1982.

G.4.1/5. In co-operation with the "Medical applications" sub-programme, a symposium on nuclear activation techniques in the life sciences was held in 1978.

G.4.1/6. Testing of a pilot system for monitoring human exposure to environmental mineral pollutants has been carried out under a regional (RCA) CRP (Table G.8, No.7), which has helped to define environmental parameters that give rise to increased exposure. Interest has been centred on the heavy metals arsenic, cadmium, lead, mercury and selenium. The project scope was revised in 1980 and the aim is now to establish analytical competence among the participating laboratories rather than provide routine monitoring of environmental pollution.

G.4.1/7. As a follow-up to the CRP on nuclear-based methods for the analysis of pollutants in human hair, a new programme (Table G.8, No.8) was started in 1979 to test the practical applicability of the methods developed.

G.4.1/8. For the purpose of analytical quality control, a reference material based on powdered scalp hair was made available in 1980 to Member States, and a preliminary report was issued in 1981.

Plans for 1983-84

G.4.1/9. The CRP on nuclear methods for health-related monitoring of trace element pollutants will be concluded during this period (Table G.8, No.8) and an evaluation of the results will be made (Table G.9, No.18).

G.4.1/10. The regional co-ordinated research project under RCA (Table G.8, No.7) will continue to be supported and an evaluation of the results will be made in 1983.

G.4.1/11. A CRP initiated in 1982 seeking to study the correlation between trace element contamination of hair and the human internal body burden will be in full operation.

G.4.1/12. In collaboration with the "Medical applications" sub-programme (G.1.4/8), a new project on the effects of certain human infectious diseases on the status of specific trace elements will be started during this period.

G.4.1/13. A number of reference materials will be made available for the purposes of analytical quality control and intercomparison studies will be carried out (see paragraph I.2.2/6).

Related activities

G.4.1/14. A regional training course on nuclear techniques for environmental and occupational studies for developing Member States party to RCA will be prepared for 1984.

G.4.1/15. The above-mentioned activities are carried out in close co-operation with the "Medical applications" sub-programme.

Co-operation with other organizations

G.4.1/16. Co-operation with other organizations concerned with the problems of environmental health (UNEP, WHO) will be maintained wherever appropriate.

Improvement of methodology of epidemiological studies of the health impacts of low-level ionizing radiation (component G.4.2)

Objective

G.4.2/1. The objective is to analyse and verify methods being used in epidemiological studies of the harmful action of low-level ionizing radiation on man, and to co-ordinate research on methodological approaches for comparing the impacts on man's health of ionizing radiation and other harmful environmental factors in the course of epidemiological studies.

Results to date

G.4.2/2. This is a new activity.

Plans for 1983-84

G.4.2/3. The CRP (Table G.8, No.9) on methodological approaches for epidemiological studies of the harmful action of low-level ionizing radiation, dealing in particular with radiation workers and the general population, will continue.

G.4.2/4. Analytical quality control of methods of multivariant regression analysis will continue during this period and an evaluation of the results will be made in 1984. A review of the subject will be prepared.

New developments foreseen for 1985-88

G.4.2/5. It is expected that a new CRP on epidemiological studies of patients exposed to ionizing radiation during treatment and diagnosis will be initiated.

Co-ordinated research programmes

Table G.8

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Formulation and implementation of maintenance plans for nuclear laboratories in South East Asia	9	0	1979/80	1984
2. Formulation and implementation of maintenance plans in Latin America	4	0	1980	1984
3. High-dose standardization and intercomparison for industrial radiation processing	7	2	1978	1983
4. Preparation of irradiated vaccines against some human diseases	6	3	1978/79	1984
5. Exploration of the possibility of high-LET radiation for non-conventional radiotherapy in cancer	2	10	1980	1985
6. Comparative biological hazards from low-level radiation and major chemical pollutants	6	1	1977	1983
7. Health-related environmental research using nuclear techniques	6	4	1978	1984
8. Nuclear methods in health-related monitoring of trace element pollutants	10	3	1979	1983
9. Improvement of methodology of epidemiological studies of health impacts from low-level radiation	0	6	1982	1985

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table G.9

No.	Document	Users	Source	Year of issue	Paragraph
1.	IAEA-TECDOC on power conditioning for nuclear instruments in developing countries	Laboratories using nuclear instruments in developing countries	Consultants	1983	G.1.1/8
2.	IAEA-TECDOC on strategies for maintenance of nuclear instruments in developing countries	As above	Consultants	1984	G.1.1/8
3.	IAEA-TECDOC: Programs for data processing in radioimmunoassay using the HP-41C calculator	Radioimmunoassay laboratories	Consultants	1983	G.1.1/9
4.	IAEA-TECDOC on protocols for quality assessment of nuclear medicine instruments	Nuclear medicine laboratories	Consultants	1983	G.1.3/6
5.	RL Series on results of intercomparison of minor and trace elements in IAEA horse kidney, H-8	Trace element analysis laboratories in Member States		1983	G.1.4/9
6.	Status report on SSDL Network with recommendations for future Agency activities	Secretariat	AG 84/1	1984	G.2.1/9
7.	Directory of High-Energy Radiotherapy Centres	SSDLs Radiotherapy Centres		1983	G.2.1/11
8.	Methodology of postal dose intercomparison in the SSDL Network	SSDLs	AG 83/1	1985	G.2.1/14
9.	A document on the Agency's Dosimetry Laboratory	As above		1983	G.2.2/3
10.	Technical Report on advances in the dosimetry of heavy-charged particles for radiotherapy and recommendations for future work	SSDLs Radiotherapists		1983	G.2.2/4
11.	Technical Report with guidelines on high-dose dosimetry for industrial radiation processing	High-dose industrial facilities and research institutes		1983	G.2.3/7
12.	Report on high-dose standardization and intercomparisons for individual radiation processing	Industrial radiation plants	Res. Co-ord. Meeting	1984	G.2.3/9

Table G.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
13.	Proceedings of symposium on high-dose dosimetry for industrial process control	Industrial radiation plants	Symposium in 1984	1985	G.2.3/10
14.	IAEA-TECDOC with updated IAEA recommended code of practice for radiation sterilization of medical supplies	Member States; Atomic Energy Authorities	AG 83/2	1983	G.3.1/6
15.	Technical Report on field application of radiometric tests for the epidemiology and diagnosis of parasitic infections	Secretariat; Member States	AG 84/2	1984	G.3.2/7
16.	Proceedings of symposium on the biological effects of low-level radiation with special regard to stochastic and non-stochastic effects	As above	Symposium in 1983	1983	G.3.3/5
17.	IAEA-TECDOC with review of the use of corpuscular radiation in non-conventional cancer therapy	As above	Consultants	1983	G.3.3/6
18.	IAEA-TECDOC on hair mineral analysis for the assessment of community exposure to environmental inorganic pollutants	As above	CRP	1984	G.4.1/9

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983		Paragraph
1	Advisory Group on the future of the dose intercomparison service	G.2.1/14
2.	Advisory Group on updating IAEA recommended code of practice for radiation sterilization of medical products	G.3.1/6

1984		
1.	IAEA/WHO SSDL Network Advisory Group	G.2.1/9
2.	Advisory Group on immunodiagnosis of parasitic infections using nuclear techniques	G.3.2/7

H. PHYSICAL SCIENCES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table H.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 411 987
Consultants	59 267
Temporary assistance	897
Sub-total	1 472 151
Common staff costs	504 412
Travel	46 329
Meetings	
Conferences, symposia, seminars	56 824
Technical committees, advisory groups	75 037
Representation and hospitality	7 300
Scientific and technical contracts	308 214
Scientific supplies and equipment	7 576
Common services, supplies and equipment	13 238
Transfer of costs:	
Translation and records services	72 109
Printing and publishing services	431 877
Data processing services	173 348
Laboratory services	1 934 178
Conference and contracts services	47 072
TOTAL	5 149 665

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 581 000	141 000	-	141 000	1 722 000	1 881 000	2 032 000
76 500	5 600	3 000	8 600	85 100	86 400	93 300
6 100	500	(400)	100	6 200	7 600	7 200
1 663 600	147 100	2 600	149 700	1 813 300	1 975 000	2 132 500
490 200	60 800	-	60 800	551 000	601 700	650 200
41 200	4 600	(3 000)	1 600	42 800	47 800	49 100
89 000	7 000	(34 000)	(27 000)	62 000	123 000	75 000
114 000	13 000	(7 000)	6 000	120 000	163 000	134 000
7 800	600	(400)	200	8 000	9 100	8 300
395 000	23 000	(83 000)	(60 000)	335 000	346 500	379 000
12 800	1 600	6 000	7 600	20 400	16 900	23 400
4 400	300	(200)	100	4 500	5 000	5 500
82 000	6 000	(20 000)	(14 000)	68 000	77 000	74 000
516 000	47 000	(67 000)	(20 000)	496 000	514 000	549 000
150 000	15 000	44 000	59 000	209 000	218 000	237 000
2 113 000	183 000	15 000	198 000	2 311 000	2 519 000	2 701 000
58 000	5 000	(4 000)	1 000	59 000	77 000	84 000
5 737 000	514 000	(151 000)	363 000	6 100 000	6 693 000	7 102 000

SUMMARY OF MANPOWER

Table H.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	6	7	7	-	7	7	7
P-4	11	10	10	-	10	10	10
P-3	7	7	7	-	7	7	7
P-2	3	3	2	1	3	3	3
Sub-total	28	28	27	1	28	28	28
GS	18	18	19	(1)	18	18	18
TOTAL	46	46	46	-	46	46	46

CHANGES IN COSTS AND MANPOWER

Costs

H/1. As will be seen from Table H.1 above, it is expected that the cost of this programme will increase by $363 000 as a net result of salary and other price increases of $514 000 partly offset by a programme decrease of $151 000.

H/2. A programme increase of $3000 is foreseen in respect of consultants' services. Programme decreases are foreseen in respect of temporary assistance ($400), travel ($3000), hospitality ($400) and scientific and technical contracts ($83 000) related to the "Industrial applications and chemistry" and the "Isotope hydrology" sub-programmes. It is planned to hold one symposium and two seminars in 1983; this will result in a programme decrease of $34 000 as compared with the 1982 budget, which included allowance for one conference and one seminar. A decrease in the number of Technical Committee and Advisory Group meetings from 15 in 1982 to 11 in 1983 results in a programme decrease of $7000. The programme increase of $6000 in scientific supplies and equipment is required for the "Isotope hydrology" sub-programme.

H/3. As regards the allocation of service costs, programme decreases are foreseen in respect of linguistic services ($20 000) and printing and publishing services ($67 000), while there will be a programme increase in data processing services ($44 000) and laboratory services ($15 000). A programme reduction of $4000 is foreseen in conference and contracts services.

H/4. As can be seen from Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that Australia will make a contribution of $385 000 and Japan of $190 000, both under RCA. The Federal Republic of Germany is expected to contribute $95 000 for three co-ordinated research programmes.

H/5. It is expected that income from CINDA publications will be $30 000 in 1983.

Manpower

H/6. As will be seen from Table H.2 above, one P-2 post from this programme is transferred to the "International Laboratory for Marine Radioactivity" programme in exchange for a GS post in the 1982 adjusted manning table. For 1983, the upgrading of one GS post to the P-2 level is foreseen in accordance with a job classification survey for data processing specialists' posts. Details and justifications are provided in Annex IV.

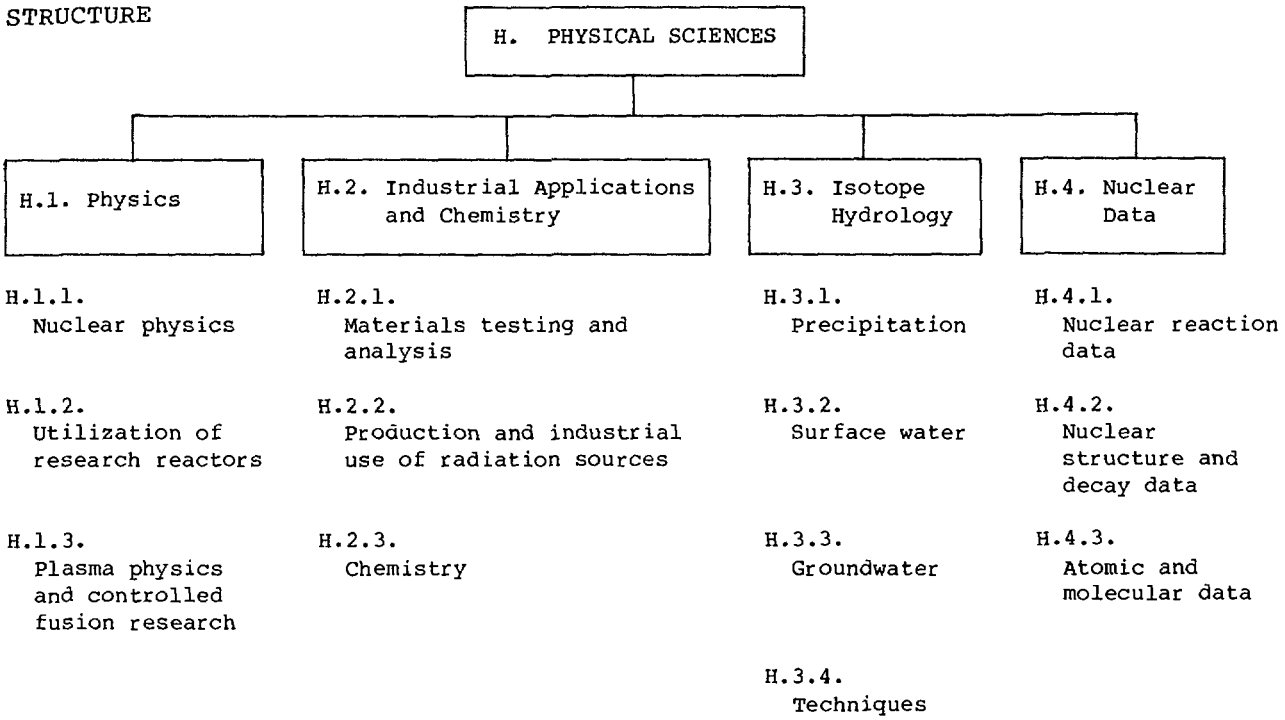
H/7. No further manpower changes are foreseen for 1984 and 1985.

THE PROGRAMME

OBJECTIVE

H/8. The objective is to assist with and stimulate research, especially in developing countries, to co-ordinate the activities of scientists and to promote the exchange of information among Member States on selected topics in various fields of nuclear physics and chemistry, and also on the industrial application of isotopes, nuclear data and isotope hydrology.

STRUCTURE



Summary of manpower and costs by sub-programme

Table H.3

Sub-programme	1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs	Man-years P	Man-years GS	Costs
Physics	4.3	2.3	798 000	4.3	2.3	934 000	4.3	2.3	939 000
Industrial applications and chemistry	5.2	2.2	2 321 000	5.2	2.2	2 645 000	5.2	2.2	2 813 000
Isotope hydrology	4.2	3.2	1 329 000	4.2	3.2	1 340 000	4.2	3.2	1 434 000
Nuclear data	14.3	10.3	1 652 000	14.3	10.3	1 774 000	14.3	10.3	1 916 000
TOTAL	28.0	18.0	6 100 000	28.0	18.0	6 693 000	28.0	18.0	7 102 000

SUB-PROGRAMME H.1

Physics

OBJECTIVE

H.1/1. The objective is to provide consultative and evaluative services in selected areas of applied and fundamental physics, through information exchange and (where appropriate) the preparation of reviews and position papers for special international programmes.

PROGRAMME TRENDS FOR 1983-84

H.1/2. Many developing Member States are meeting with the problem of how to initiate and later expand their nuclear-related activities. International co-operation in the introduction of nuclear-based techniques for applied studies and the training of the technical staff who will carry out nuclear programmes can contribute towards the efficient planning of national projects. Requests from developing countries for guidance and advice are received by the Agency in connection with nuclear and solid-state physics, instrumentation, and the utilization of research reactors and low-energy accelerators.

H.1/3. International co-operation in the field of thermonuclear fusion is to be centred on the continuation of the INTOR activities. In addition, information exchange on alternative fusion devices will be promoted, and an effort will be made to attract scientists from developing Member States to fusion research by suggesting appropriate topics for work in suitable laboratories.

Physics

Summary by programme components

Table H.4

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Nuclear physics	2.3	0.8	182 500	36 000	55 000	2 500	276 000
Utilization of research reactors	1.0	0.5	83 900	31 000	30 000	4 100	149 000
Plasma physics and controlled fusion research	1.0	1.0	106 600	32 000	20 000	11 400	170 000
Linguistic services	-	-	-	-	-	14 000	14 000
Printing and publishing services	-	-	-	-	-	155 000	155 000
Data processing services	-	-	-	-	-	8 000	8 000
Conference and contracts services	-	-	-	-	-	26 000	26 000
TOTAL	4.3	2.3	373 000	99 000	105 000	221 000	798 000

Nuclear physics (component H.1.1)

Objective

H.1.1/1. The objective is to identify and analyse the nuclear methods particularly suitable for developing Member States and to promote their development and application; and to assist Member States with the design of their training and research programmes in the relevant fields.

Results to date

H.1.1/2. Reviews have been made of the following subjects in relation to the specific conditions and problems of developing Member States: positron annihilation techniques in applied research; the design of suitable programmes for training courses on physical sciences; radiation damage studies using nuclear techniques; and the use of microprocessors in nuclear instrumentation.

H.1.1/3. A document on nuclear science research and teaching at universities in developing countries was issued in 1981.

H.1.1/4. The last in the series of symposia on the physics and chemistry of fission was held in 1979.

Plans for 1983-84

H.1.1/5. The usefulness to developing Member States of implantation studies with low-energy accelerators and of nuclear methods in corrosion studies will be evaluated with the aid of consultants (Table H.9, Nos 1 and 2). A CRP on positron annihilation will be completed (Table H.8, No.1).

H.1.1/6. Advice on the design of national applied nuclear physics programmes will be compiled and published (Table H.9, No.3).

H.1.1/7. A regional seminar on radiation detectors will be held for Africa in 1983 (Annex I(14)).

H.1.1/8. The study of training and research in nuclear sciences at universities will be completed in 1984 and a publication on the topic will be prepared (Table H.9, No.4).

Related activities

H.1.1/9. Twenty-seven technical co-operation projects were serviced in 1981: the number is increasing. Also, technical guidance was provided for six large-scale UNDP projects.

H.1.1/10. A study tour on the application of low-energy accelerators and two training courses on nuclear electronics were supported. The continuous process of reviewing and upgrading training courses will continue.

Utilization of research reactors (component H.1.2)

Objective

H.1.2/1. The objective is to promote the efficient use of research reactors in developing Member States - by giving advice and organizing training and co-ordinated research in selected fields - and to study problems related to research reactor core conversion from highly enriched to low-enriched nuclear fuel.

Results to date

H.1.2/2. The latest in a series of seminars on improving the utilization of research reactors was held in 1981 with participants from 36 Member States. A regional seminar on the utilization of research reactors and neutron generators was held in Istanbul in 1980.

H.1.2/3. The effects of neutron irradiation on diagnostic equipment were studied under a CRP completed in 1982. A further programme which also finished in the same year was concerned with neutron scattering techniques in applied research.

H.1.2/4. A Directory of Research Reactors in Member States was published in 1980 in microfiche format.

H.1.2/5. A document on research reactor renewal and upgrading was issued in 1978 and a comprehensive guidebook on the conversion of light-water research reactors published in 1980. Missions have been sent to ten countries to advise on the conversion of specific research reactors.

Plans for 1983-84

H.1.2/6. A document on safety and licensing issues connected with the conversion of research reactors from highly enriched to low-enriched fuel will be completed (Table H.9, No.5). A CRP on the use of research reactors in safety studies will be started in 1983.

H.1.2/7. A status report on instrumentation and control systems will be prepared (Table H.9, No.6). In connection with research reactor conversion, a summary report will be drawn up on the performance of reduced-enrichment fuel, containing advice on future activities in this area (Table H.9, No.7).

H.1.2/8. Publications will be prepared on the use of research reactors for basic research in developing countries and on possible alternatives to such reactors (Table H.9, Nos 8 and 9).

H.1.2/9. A seminar will be held in 1983 on research reactor utilization and management, experience with reduced enrichment cores, and research and training programmes in developing countries (Annex I(15)).

Related activities

H.1.2/10. Technical missions to advise on core conversion for specific research reactors will continue.

H.1.2/11. Technical co-operation projects to modernize and upgrade research reactors were undertaken in Bulgaria and Yugoslavia in 1981.

New developments foreseen for 1985-88

H.1.2/12. As new low-enrichment fuel becomes available and more reactors undertake core conversion, assistance will be given to Member States in connection with the refuelling and shipment of old fuel and in the preparation of documents required by national regulatory bodies.

Co-operation with other organizations

H.1.2/13. The research reactor core conversion programme is supported in part by funds from the Federal Republic of Germany and the United States. Continued contact is maintained with the principal laboratories engaged in this activity.

Plasma physics and controlled fusion research (component H.1.3)

Objective

H.1.3/1. The main objective is to promote international co-operation in controlled thermonuclear fusion and in related plasma and nuclear physics programmes and to assist the work of Member States within the INTOR project.

Results to date

H.1.3/2. A scientific secretary has been provided for IFRC since its initiation.

H.1.3/3. The INTOR Workshop, which was started in 1978 with the objective of assessing the scientific and technological basis for construction of the next step in the tokamak approach to a thermonuclear reactor, is continuing. The conceptual design report was completed in July 1981. The Agency has accepted the recommendation of the IFRC that the Workshop should be taken into the first part of the design stage (Phase IIA), which will continue until July 1983.

H.1.3/4. International conferences and meetings of experts in the field of controlled fusion and plasma physics were held in 1978 and 1980 to review the progress and delineate remaining critical areas in research.

Plans for 1983-84

H.1.3/5. The INTOR project will continue with the work on optimization of the conceptual design (Table H.9, No.10). The future of the INTOR project will be considered by the participating countries at the end of this phase. The Agency will assist in the formulation of legal and administrative measures for the permanent organization of the INTOR project if a decision is taken by participating Member States to proceed to subsequent stages.

H.1.3/6. Assistance will be given to the IFRC in carrying out its function of information exchange and national fusion programme co-ordination and in its role in overseeing the INTOR project. A report on the status of fusion devices will be prepared (Table H.9, No.11).

H.1.3/7. Critical aspects of fusion research will be under permanent re-examination so that international resources can be concentrated on the most useful areas (Table H.9, Nos 12-17). A CRP designed to include laboratories in developing Member States in fusion and plasma physics research will continue (Table H.8, No.2).

H.1.3/8. The Tenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research will be organized in 1984 (Annex II(16) and Table H.9, No.18).

Co-operation with other organizations

H.1.3/9. The Agency will continue to co-ordinate the activities in nuclear fusion with the IEA through the IFRC, some of whose members represent the IEA.

SUB-PROGRAMME H.2

Industrial applications and chemistry

OBJECTIVE

H.2/1. The objective is to promote the transfer of technology relating to the industrial application of isotopes and radiation having the greatest economic and social benefit to developing Member States, with special emphasis on the use of nuclear techniques in the exploitation of natural resources and the use of radiation technology for industry; to assist developing Member States by advising on the preparation and use of radiopharmaceuticals and other labelled compounds; to assist Member States with relevant nuclear analytical methods, including those used for safeguards; to assist them by ensuring the availability of chemical standards; and to advise on the chemical aspect of fusion reactor technology.

PROGRAMME TRENDS FOR 1983-84

H.2/2. The International Conference on the Industrial Application of Radioisotopes and Radiation Technology (Grenoble, 1981) put great emphasis on the use of this technology in the exploration of natural resources, protection of the environment, and the development of industrial processes that consume smaller amounts of material and use less energy. The importance of these areas will be reflected in the programme.

H.2/3. Industrial applications are often still at an early stage in developing Member States. Considerable attention is therefore given in the programme to technology transfer through RCA and other technical co-operation projects.

Industrial applications and chemistry

Summary by programme components

Table H.5

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Materials testing and analysis	1.6	0.6	131 900	-	30 000	3 100	165 000
Production and industrial use of radiation sources	2.0	0.6	163 600	16 000	50 000	4 400	234 000
Chemistry	1.6	1.0	148 000	-	20 000	4 000	172 000
Linguistic services	-	-	-	-	-	4 000	4 000
Printing and publishing services	-	-	-	-	-	71 000	71 000
Data processing services	-	-	-	-	-	1 000	1 000
Laboratory services	-	-	-	-	-	1 664 000	1 664 000
Conference and contracts services	-	-	-	-	-	10 000	10 000
TOTAL	5.2	2.2	443 500	16 000	100 000	1 761 500	2 321 000

Materials testing and analysis (component H.2.1)

Objective

H.2.1/1. The objective is to promote the use of nuclear techniques in the exploration and processing of natural resources in developing Member States.

Results to date

H.2.1/2. The use of nuclear techniques in mineral exploration, mining and processing and sea-bed mineral exploration was reviewed in 1980 and 1981.

H.2.1/3. Techniques for the continuous on-line analysis of coal for ash, moisture and specific energy have been developed under a CRP on the use of X-ray and neutron techniques completed in 1982.

H.2.1/4. Technical and economic aspects of the use of nuclear techniques in exploration and the mining and processing of natural resources (including coal, oil, gas and uranium) were reviewed at the Grenoble Conference in 1981.

Plans for 1983-84

H.2.1/5. A CRP on the use of nuclear analytical techniques in mineral exploration, mining and processing (started in 1982) will continue, mainly in countries in Africa. A review will be made of the use of X-ray and neutron techniques for on-line process control in mineral processing (Table H.9, No.19).

H.2.1/6. Recent advances in the use of electron spectroscopy techniques as analytical probes will be reviewed (Table H.9, No.20).

Related activities

H.2.1/7. Two NDT (non-destructive testing) experts' meetings were held in 1981 under the RCA/UNDP programme on regional certification in Asia and the Pacific.

H.2.1/8. A training seminar on nuclear analytical methods for mineral exploration was held in 1982: UNDP-funded courses on NDT are planned for 1983.

H.2.1/9. A regional co-operative project on mineral exploration is to be implemented in 1983 in the region of Asia and the Pacific.

Co-operation with other organizations

H.2.1/10. This component will involve co-operation with UNIDO, ECOSOC's Committee on Natural Resources, other United Nations bodies and various governmental organizations.

Production and industrial use of radiation sources (component H.2.2)

Objective

H.2.2/1. The objective is to arrange for a comprehensive review of the status of the industrial applications of isotopes and radiation; and to encourage research in developing countries on the preparation of isotopes, labelled compounds and radiopharmaceuticals.

Results to date

H.2.2/2. A large-scale UNDP project on the industrial application of radioisotopes and radiation technology in Asia and the Pacific region (RCA) was prepared with the assistance of experts and proposed to UNDP in 1980. The Preparatory Assistance Project was then, with the co-operation of all Member States party to RCA, initiated in 1980-82 for the sub-projects on radiation processing, nucleonic control systems and NDT.

H.2.2/3. The economic and social benefits of this radiation technology in major branches of industry were reviewed at the Grenoble Conference in 1981, with special reference to the development of new applications to bioengineering (such as immobilization of bioactive species and preparation of biocompatible materials).

H.2.2/4. Techniques for preparing permselective membranes and biocompatible materials were developed under a CRP started in 1980 (Table H.8, No.3). Under another programme, completed in 1981, a new switching mode was developed for the injection of samples in electron capture gas chromotography; this resulted in an increase in the sensitivity of the method.

H.2.2/5. The use of tracer technology in chemical processing industries was reviewed by consultants in 1980. Their recommendations will be published in the International Journal of Applied Radiation and Isotopes.

H.2.2/6. Topics reviewed by consultants in 1980-81 include: the synthesis of stable-isotope labelled compounds and their applications in life sciences: the feasibility of producing $^{99}Tc^{m}$-generators with low-power research reactors; recent developments in positron annihilation techniques; the quality control of radiopharmaceuticals in developing countries; and the possibility of using cyclotron technology in nuclear medicine in developing countries. Reports of these meetings have been distributed to research groups in Member States.

H.2.2/7. A new CRP aimed at encouraging developing Member States to search for new and more specific radiopharmaceuticals was initiated in 1982.

Plans for 1983-84

H.2.2/8. A CRP on the preparation of radiopharmaceuticals from accelerator-produced isotopes (Table H.8, No.4) will be completed in 1983; the programme on radiation-modified polymers (Table H.8, No.3) will end in the same year.

H.2.2/9. The CRP on biomass conversion (Table H.8, No.5) will be re-oriented towards the radiation immobilization of bioactive species.

H.2.2/10. Reports will be prepared with the help of consultants on: the role of microprocessors in tracer technology and nucleonic gauging (to assist industrialization programmes in developing countries); and the use of tracers to increase energy utilization efficiency in processing industries (Table H.9, Nos 21 and 22).

H.2.2/11. The use of nuclear techniques for industrial safety and pollution control will be reviewed (Table H.9, No.23). The efficiency, economics and energy-saving capability of radiation processing systems will form the subject of a document to be produced in 1983 (Table H.9, No.24).

H.2.2/12. The current status and future trends of multi-purpose and single-purpose food irradiators will be reviewed in collaboration with the "Food and Agriculture" programme (Table H.9, No.25).

H.2.2/13. A CRP will be initiated in 1982 with the aim of developing $^{99}Tc^{m}$-generators using low-power research reactors in developing Member States.

H.2.2/14. A conference on radiopharmaceuticals and labelled compounds will be held in 1984 (Annex II(17)).

Related activities

H.2.2/15. Two electron-beam processing facilities are under construction as part of large-scale UNDP projects in Egypt and Yugoslavia.

H.2.2/16. The large-scale UNDP Industrial Project under RCA for the developing Member States in Asia and the Pacific will be fully implemented in the fields of radiation processing, tracer technology, NDT, nucleonic gauging and mineral processing, through the installation of equipment, demonstration activities and training of manpower.

H.2.2/17. Regional co-operative projects on the industrial application of isotopes and radiation technology will be planned for developing Member States in Latin America.

H.2.2/18. The construction of two cobalt-60 irradiators and two electron-beam accelerators for industrial processing has been promoted in developing Member States through technical co-operation.

H.2.2/19. During 1981, support was given to 77 technical co-operation projects. One training course, one study tour and one workshop were supported.

New developments foreseen for 1985-88

H.2.2/20. Special attention will be given to technologies associated with the use of highly enriched targets for reactor and cyclotron production of radioisotopes.

Co-operation with other organizations

H.2.2/21. This component involves co-operation with national, regional and international organizations, in particular UNDP.

Chemistry (component H.2.3)

Objective

H.2.3/1. The objective is to assist in the exchange of information on chemical standards for safeguards and nuclear analysis, to advise on chemical aspects of fusion reactors, and to advise developing Member States on matters related to the chemistry of isotopes and radiopharmaceuticals.

Results to date

H.2.3/2. By the end of 1982, nine volumes of thermodynamic data on the actinide elements will have been published.

H.2.3/3. A CRP on chemical aspects of nuclear methods of analysis was initiated in 1981 (Table H.8, No.7).

H.2.3/4. A technical document on chemical aspects of fusion technology was published in 1982.

Plans for 1983-84

H.2.3/5. Volumes 10-14 of "Chemical Thermodynamics of Nuclear Materials" (H.2.3/2) will be published in 1983 (Table H.9, No.26).

H.2.3/6. Reports will be prepared with the aid of consultants on: the chemistry of nuclear materials and standards related to safeguards; the applicability of the latest advances in nuclear analytical techniques for use in developing countries; and recent advances in the chemistry and biochemistry of radiopharmaceuticals (Table H.9, Nos 27-29 and Table H.8, No.6).

H.2.3/7. A CRP on radiation degradation of organic materials used in nuclear power plants will be initiated in 1983.

Related activities

H.2.3/8. Training courses on the preparation and control of radiopharmaceuticals are planned.

New developments foreseen for 1985-88

H.2.3/9. Chemical aspects of fusion technology will receive special attention.

SUB-PROGRAMME H.3

Isotope hydrology

OBJECTIVE

H.3/1. The objective is to support the development of isotope and geochemical techniques for use in water-related studies, by employing such techniques directly in hydrological investigations of practical interest to Member States and by helping Member States to acquire technical competence or increase their capabilities, and to collect and disseminate basic data and information relating to isotope hydrology.

PROGRAMME TRENDS FOR 1983-84

H.3/2. The United Nations Water Conference in 1977 focussed world attention on the need for concerted action to meet the future needs for

water. The International Hydrological Programme (IHP), executed by UNESCO, enters its third phase in 1984. This phase places stronger emphasis on the solution of practical problems, in particular of problems in arid, semi-arid and humid tropics. One of the themes is concerned with the application of special technologies and identifies nuclear techniques as a principal subject.

H.3/3. Nuclear techniques for hydrology are still at an early stage in the developing Member States and the present sub-programme has evolved in the light of this situation and the priorities established in the future phases of the IHP. The emphasis is on the transfer of applied technology to the developing Member States and on training, with particular reference to arid regions. It may also be noted that part of the RCA Isotope Hydrology Project, financed by the Australian Government, is concerned with the IHP priority area of humid tropics.

Isotope hydrology

Summary by programme components

Table H.6

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Precipitation	0.4	1.1	51 300	-	5 000	3 700	60 000
Surface water	0.7	0.5	69 500	-	10 000	4 500	84 000
Groundwater	2.1	1.0	177 200	-	20 000	6 800	204 000
Techniques	1.0	0.6	91 700	38 000	25 000	6 300	161 000
Linguistic services	-	-	-	-	-	8 000	8 000
Printing and publishing services	-	-	-	-	-	120 000	120 000
Data processing services	-	-	-	-	-	39 000	39 000
Laboratory services	-	-	-	-	-	647 000	647 000
Conference and contracts services	-	-	-	-	-	6 000	6 000
TOTAL	4.2	3.2	389 700	38 000	60 000	841 300	1 329 000

Precipitation (component H.3.1)

Objective

H.3.1/1. The objective is to compile and disseminate information on the isotopic composition of precipitation in different parts of the world to be used by Member States in applied hydrological and hydrometeorological investigations.

Results to date

H.3.1/2. Information on the tritium, deuterium and oxygen-18 composition of precipitation (together with the amount of precipitation, vapour pressure and temperature) arising from analyses in laboratories of Member States and the Agency, is published periodically in the Technical Reports Series (seven volumes by 1982). In order to facilitate the use of these data for applied hydrological studies, a statistical treatment was published in 1981.

Plans for 1983-84

H.3.1/3. Precipitation data will continue to be published at approximately

two-year intervals (Table H.9, No.30). Recent unpublished data will be made available on the request of institutions in Member States.

H.3.1/4. In view of the potential use of environmental isotope techniques in studying hydrological problems in arid regions, a study will be made by the Secretariat of the possibility of sampling the scarce precipitation in these areas for isotopic assay.

Related activities

H.3.1/5. Some of the data for samples from countries having no appropriate laboratory facilities will be derived from analyses performed in the Agency's Laboratory.

Co-operation with other organizations

H.3.1/6. This component involves co-operation with WMO and national meteorological services of Member States.

Surface water (component H.3.2)

Objective

H.3.2/1. The objective is to encourage, support and evaluate developments in the application of isotope techniques in surface water investigations relating - inter alia - to interrelations between surface water and groundwater, lake dynamics, river discharge, suspended sediment and bed load transport.

Results to date

H.3.2/2. The application of isotope techniques to problems of sediment transport has been the principal subject of this component. During 1980 and 1981, these techniques were introduced into Sri Lanka and Singapore to study coastal erosion and sediment movement in harbour approaches.

H.3.2/3. A pilot study was initiated in 1980 for gauging the flow of the Rufiji river in Tanzania.

Plans for 1983-84

H.3.2/4. It is planned in 1983 to review with the help of consultants the results of a follow-up study of the use of tritium for gauging the discharge of the Rufiji river and to assess the utility of the method for similar situations where conventional hydrological methods cannot be used (Table H.9, No.31).

H.3.2/5. The results of national projects on the potential use of caesium-137 in studies of soil erosion of watersheds and sedimentation of lakes and reservoirs - initiated in 1981 within the framework of the RCA Isotope Hydrology project (Table H.8, No.8) - will be evaluated in 1984 and recommended procedures and measurement techniques will be established (Table H.9, No.32).

Related activities

H.3.2/6. Three technical co-operation projects were serviced in 1981. Various applications of isotope techniques in surface water hydrology were included in the scope of an IAEA/UNESCO regional seminar on the use of isotope techniques in water resources development in Asia and the Pacific (held in Colombo in 1981) and also in international post-graduate hydrological training courses held in Padua and Graz.

Co-operation with other organizations

H.3.2/7. This component involves co-operation with UN-DTCD, UNESCO and FAO.

Groundwater (component H.3.3)

Objective

H.3.3/1. The objective is to advise developing Member States and to provide services in connection with the use of isotope geochemical techniques for the solution of hydrological problems associated with groundwater resources, recharge, dynamics, geothermal exploration and assessment of sites for storage of waste.

Results to date

H.3.3/2. Since 1978, groundwater field studies have been initiated in 19 countries under the technical co-operation programme and under sub-contracts to other organizations of the United Nations system. Many of these are in arid and semi-arid regions and a synthesis of experience in using environmental isotope techniques in this type of environment was published in 1980.

H.3.3/3. Advisory services on isotope hydrology techniques have been given to Member States and the scope of this activity has been broadened to include applications in geothermal exploration (for example, in Mexico in 1980).

Plans for 1983-84

H.3.3/4. The CRP organized in co-operation with GSF and financially supported by the Government of the Federal Republic of Germany (Table H.8, No.9) will be completed during this period. Work will be carried out through this programme and through research contracts on the development and testing of new isotopic techniques in hydrology and geochemistry (especially groundwater assessment) and their use to complement other techniques. Special attention will be given to arid and semi-arid regions.

H.3.3/5. A review will be made of hydrological models based on isotope data (Table H.9, No.33).

H.3.3/6. The CRP being carried out in Asia and the Pacific region under RCA, and financially supported by the Australian Government, will continue during this biennium (Table H.8, No.8).

H.3.3/7. A CRP is planned to start in 1983 on the use of long-lived radioisotopes for measurement of very low groundwater flow rates in media of potential use for the storage of waste.

Related activites

H.3.3/8. Nine technical co-operation projects were serviced in 1981. Applications of isotope techniques in groundwater hydrology formed the major subject of the programme of the IAEA/UNESCO regional seminar (H.3.2/6).

H.3.3/9. Advisory and laboratory services to Member States in connection with water and geothermal resources assessment will continue.

Co-operation with other organizations

H.3.3/10. This component involves co-operation with UN-DTCD, UNDP, UNESCO and FAO.

Techniques (component H.3.4)

Objective

H.3.4/1. The objective is to assist developing Member States in establishing the analytical capabilities necessary for the application of isotope techniques in hydrology and geochemistry; and to review and evaluate new applications of isotope techniques in hydrology, recent refinements of such techniques and the application of new methods of data treatment.

Results to date

H.3.4/2. The present status and recent developments in the assay of environmental tritium in natural waters were reviewed and the results published in 1981. The general subject of low-level counting and spectrometry was discussed at a symposium held in 1981.

H.3.4/3. A monograph on stable-isotope hydrology, issued in 1982, is the first publication to provide hydrologists and geochemists with a detailed review of the principles of stable-isotope techniques and their applications to hydrology. A new edition of the "Guidebook on Nuclear Techniques in Hydrology" has been prepared and is scheduled for publication in 1982. The preparation of both these publications has been supported by UNESCO and the International Hydrological Programme.

H.3.4/4. Within the RCA Isotope Hydrology Project, financed by the Australian government, environmental isotope analytical facilities have been installed in Indonesia, the Republic of Korea, Malaysia and Thailand (Table H.8, No.8).

H.3.4/5. A regional seminar on isotope hydrological applications was organized in Colombo in 1981.

Plans for 1983-84

H.3.4/6. The results of intercomparison measurements of stable-isotope standards will be reviewed in order to obtain recommendations on the accepted values of the standards and on future activities by the Agency in this area (Table H.9, No.34).

H.3.4/7. Follow-up assistance to recently established environmental tritium laboratories will be given by arranging for intercomparisons of water samples of varying levels of tritium concentration and advising on operational problems and developments in new techniques.

H.3.4/8. A symposium on isotope hydrology in water resources development will be held in 1983 (Annex I(16) and Table H.9, No.35).

H.3.4/9. A seminar on the use of isotope techniques in water resources development, intended for hydrologists at the management level, will be held in the Latin American region in 1984 (Annex II(18)).

Related activities

H.3.4/10. Four technical co-operation projects concerned with the establishment of environmental isotope analytical facilities in India, Jordan and Mexico were serviced in 1981. Analytical support to the RCA Isotope Hydrology Project was provided by the Agency's Laboratory.

New developments foreseen for 1984-88

H.3.4/11. Recent advances in interpretative methods of environmental isotope data for hydrological applications will be reviewed in order to provide

guidance to recently established isotope hydrology groups. Consideration will be given to the preparation of guidance material such as computer programs for data treatment.

H.3.4/12. Support will continue to be given in the establishment of environmental isotope analytical laboratories in developing Member States. It is planned to organize a training course in the Agency's Laboratory on recent developments in analytical techniques and data treatment.

Co-operation with other organizations

H.3.4/13. The Agency will continue to contribute to the International Hydrological Programme by providing inputs to specific projects.

H.3.4/14. This component, particularly the training aspects, will involve co-operation with UNESCO.

SUB-PROGRAMME H.4

Nuclear data

OBJECTIVE

H.4/1. The objectives are to assess the status of and the need for nuclear and atomic data, to support the measurement, calculation and evaluation of nuclear and atomic data, to engage in and co-ordinate the compilation, analysis and exchange of nuclear and atomic data, to promote the transfer of nuclear data technology to developing Member States, and to offer nuclear and atomic data centre services to Member States.

PROGRAMME TRENDS FOR 1983-84

H.4/2. In general, the Agency's nuclear data programme reflects the changing priorities and requirements of Member States as defined through the continuing review and guidance provided by the International Nuclear Data Committee (INDC) (Table H.9, No.36). As a consequence, there will be a continuation of the current gradual shift of the programme from the co-ordination of activities in developed Member States to the stronger participation of developing Member States and to an enhanced transfer of nuclear data information and expertise to these States. Increased emphasis will be given to reviewing the data needs in specific areas such as radiation damage and nuclear safety assessment, nuclear materials safeguards and fusion.

H.4/3. Specifically, major emphasis will continue to be placed on providing the developing Member States with nuclear data information and data processing computer programs. In view of the increase in the number and diversity of requests for nuclear data received by the Agency, there is a strong need to improve existing data files - with regard to their accuracy, standardization and validation. Emphasis will also be placed on the development of reference evaluated nuclear data files for specific applications and on the publication of standard reference data handbooks.

H.4/4. In the field of atomic and molecular data for fusion, the activities aimed at the development of an international data service to the fusion community will continue, with particular regard to the needs of the Agency's INTOR project. Increasing emphasis will be placed on co-ordinating the collection and evaluation of atomic collision data required for magnetic confinement fusion devices.

Nuclear data

Summary by programme components

Table H.7

Programme component	Man-years		1983 Cost estimates				
	P	GS	Staff	Meetings	Contracts	Other	Total
Nuclear reaction data	9.1	6.1	724 200	8 000	45 000	18 800	796 000
Nuclear structure and decay data	2.1	2.1	180 900	21 000	5 000	2 100	209 000
Atomic and molecular data	3.1	2.1	253 000	-	20 000	4 000	277 000
Linguistic services	-	-	-	-	-	42 000	42 000
Printing and publishing services	-	-	-	-	-	150 000	150 000
Data processing services	-	-	-	-	-	161 000	161 000
Conference and contracts services	-	-	-	-	-	17 000	17 000
TOTAL	14.3	10.3	1 158 100	29 000	70 000	394 900	1 652 000

Nuclear reaction data (component H.4.1)

Objective

H.4.1/1. The objective is to compile, exchange and disseminate experimental and evaluated neutron, photonuclear and charged-particle nuclear data and make them available upon request to Member States; to co-ordinate the activities of regional data centres; to review the requirements for nuclear reaction data of major importance in nuclear science and technology; to support and co-ordinate experimental and theoretical research relating to such data; and to promote the transfer of nuclear reaction data technology to developing Member States.

Results to date

H.4.1/2. In response to over 1500 requests received from Member States from the beginning of 1978 until the end of 1981, the Agency has sent out more than 133 000 numerical data sets, 1650 reports and 240 data processing computer codes.

H.4.1/3. Since 1970, the Agency has contributed to the systematic world-wide compilation and exchange of nuclear reaction data, using the computer-based EXFOR system. By 1981, seven nuclear reaction data centres were co-operating in this international effort, which is co-ordinated by the Agency.

H.4.1/4. The computer index to the literature on neutron data (CINDA) has been published annually since 1970; CINDA-81, a cumulative compendium of neutron data references covering the years 1977-81, was issued in 1981.

H.4.1/5. Most of the significant discrepancies in existing actinide evaluations and the data accuracies required for the safety of the nuclear fuel cycle have been identified in the course of a CRP on the intercomparison of evaluated actinide neutron nuclear data (completed in 1982).

H.4.1/6. The status of nuclear data of importance in various fields (medical radioisotope production, the determination of uranium and plutonium resonance parameters and studies of radiation damage and safety) was reviewed in 1981.

H.4.1/7. The 1981/1982 edition of the biennial WRENDA publication, which summarizes the current requests for nuclear data needed in nuclear technology, was published in 1981.

H.4.1/8. Two specific, technology-oriented assessments of data needs were prepared in 1981: a preliminary survey on the availability and quality of evaluated nuclear data important for fusion reactor technology and a review of the nuclear data used in safeguards and nuclear fuel analysis.

H.4.1/9. The annual report on progress in fission product nuclear data, summarizing the current research activities in this field, has continued to be published.

Plans for 1983-84

H.4.1/10. Computer programs for format translation and for data validation and checking will be prepared (Table H.9, No.37) to assist developing Member States. Emphasis will also be put on benchmark testing of evaluated data.

H.4.1/11. Co-ordination between data centres on the compilation, evaluation, exchange and dissemination of nuclear reaction data will continue to be reviewed (Table H.9, No.38).

H.4.1/12. The annual publication of CINDA (H.4.1/4) and the biennial publication of WRENDA (H.4.1/7) will be continued (Table H.9 Nos 39 and 40).

H.4.1/13. A review will be made (Table H.9, No.41) of the development of the international reference file of nuclear and atomic data required for the evaluation of radiation damage to structural materials in fission and fusion reactors.

H.4.1/14. The need for and status of nuclear data for safeguards will be assessed (Table H.9, No.42) and a handbook of nuclear data reference values for safeguards will be prepared (Table H.9, No.43).

H.4.1/15. The growing need for nuclear data used in bulk material analysis in mining and industry will be reviewed with the assistance of consultants (Table H.9, No.44).

H.4.1/16. A revised edition of the "Handbook on Nuclear Activation Cross-Sections", published in 1974, is planned for 1983 (Table H.9, No.45).

H.4.1/17. A computer-based reference file of evaluated nuclear data for use in fusion reactor design calculations, tailored specifically for INTOR requirements, will be developed and validated by inter-laboratory comparisons of fusion benchmark calculations (Table H.9, No.46).

H.4.1/18. The current status of standard reference nuclear data will be reviewed in 1984 and a report on standard reference data used in nuclear data measurements and computations will be produced (Table H.9, No.47).

H.4.1/19. Reviews will be made (Table H.9, Nos 48 and 49) of the status of basic and applied nuclear level densities (which constitute the most important input parameters for nuclear model calculations) and the need for and status of transactinium isotope nuclear data.

H.4.1/20. A report will be prepared on the fast-fission cross-section of uranium-235 (Table H.9, No.50).

H.4.1/21. A compilation of transactinium isotope evaluated nuclear data with associated uncertainties will be created through work under a CRP to be initiated in 1983 (Table H.9, No.51).

H.4.1/22. The CRP (Table H.8, No.10) designed to improve the availability and accuracy of 14-MeV neutron nuclear data required for the development of fission and fusion reactor technology will be continued.

H.4.1/23. The basic foundations and definitions of nuclear model parameters used in nuclear data calculations will be the topic of a course in 1984 organized in co-operation with the Trieste Centre (Table H.9, No.52).

H.4.1/24. A compendium of lectures given at a technical co-operation training course to be held in 1983 on the methodology of evaluation and processing of nuclear data for nuclear reactor applications will be published (Table H.9, No.53).

Related activities

H.4.1/25. The technical co-operation Interregional Project on Nuclear Data Techniques and Instrumentations, started in 1981, is expected to continue until 1986. Twenty developing Member States participated in this project in 1981. Expert missions, fellowships and scientific visits will be organized and the procurement of needed equipment and isotope sample material will be arranged. Two expert missions were undertaken in 1981: one was to four South American countries and the other to three East European countries.

Co-operation with other organizations

H.4.1/26. This component involves co-operation with NEA, CEC and nuclear data centres in Brazil, Japan, the Soviet Union and the United States.

Nuclear structure and decay data (component H.4.2)

Objective

H.4.2/1. The objective is to review the requirements for nuclear structure and decay data of importance in the application of radiation and isotopes; to co-ordinate internationally the compilation, evaluation and dissemination of such data; to promote the measurement and evaluation of required data; and to provide data centre services to users of such data.

Results to date

H.4.2/2. The Agency has continued to co-ordinate the international network of data centres and research groups established for the systematic evaluation of mass-chain nuclear structure data. The results of this international effort are published in the Nuclear Data Sheets journal, and compiled in the internationally available computer-based Evaluated Nuclear Structure Data File (ENSDF).

H.4.2/3. An interim set of recommended heavy-radionuclide decay data has been obtained from a CRP on the measurement and evaluation of transactinium isotope nuclear decay data (1977-82).

H.4.2/4. An interim listing of recommended decay data for radionuclides used as calibration standards in nuclear data measurements has been produced and included in the INDC/NEANDC Standards file.

Plans for 1983-84

H.4.2/5. Representatives of the data centres and groups participating in the international NSDD (nuclear structure and decay data) network for the systematic evaluation of mass-chain nuclear structure data are convened every second year by the Agency. The next meeting of network representatives is planned to be held in 1984 (Table H.9, No.54).

H.4.2/6. A new CRP to evaluate transactinium decay data already measured and to produce a final set of recommended heavy-radionuclide decay data will be initiated in 1983. The results will be used to create a computer-based file of international reference status (Table H.9, No.55).

H.4.2/7. The list of recommended decay data for radionuclides used as calibration standards in nuclear data measurements will continue to be updated (as computer-based files) for the INDC/NEANDC Standards files (Table H.9, No.56).

Co-operation with other organizations

H.4.2/8. This component involves co-operation with CEC and nuclear data centres in Brazil, the Federal Republic of Germany, Japan, the Soviet Union and the United States.

Atomic and molecular data (component H.4.3)

Objective

H.4.3/1. The objective is to review the requirements for atomic and molecular data in nuclear fusion research and technology and to co-ordinate internationally the compilation, evaluation, publication and dissemination of such data.

Results to date

H.4.3/2. The "International Bulletin on Atomic and Molecular Data for Fusion", designed to assist in fusion research and in the development of fusion technology by providing an indexed listing of recent references to articles on atomic and molecular data pertinent to fusion and recently determined and unpublished atomic and molecular data, has been issued quarterly since July 1977.

H.4.3/3. The first edition of the computer-based index to published references on atomic and molecular collision data relevant to fusion (CIAMDA) was published in 1980.

H.4.3/4. A review was made in 1980 of the atomic and molecular data currently required in fusion research; the results were published in the Physica Scripta journal.

H.4.3/5. The available data pertinent to plasma-wall interactions in magnetic confinement plasma devices have been reviewed and evaluated under a CRP. The set of review articles which resulted from this programme is to be published in the Agency's Nuclear Fusion journal.

H.4.3/6. A CRP (Table H.8, No.11) on atomic collision data for diagnostics of magnetic confinement fusion plasmas was initiated in 1981.

H.4.3/7. The co-ordination of the international exchange of atomic and molecular data pertinent to fusion research and technology was assessed in 1980 by representatives of atomic data centres and groups.

H.4.3/8. The Subcommittee on Atomic and Molecular Data of the IFRC met in 1981 and made specific recommendations to the Agency regarding its bibliographic and numerical data centre services to the fusion community.

Plans for 1983-84

H.4.3/9. The IFRC Subcommittee on Atomic and Molecular Data (cost-free experts) will meet in 1984 to review the planning and execution of the Agency's atomic and molecular data programme for fusion (Table H.9, No.57).

H.4.3/10. Publication of the quarterly "International Bulletin on Atomic and Molecular Data for Fusion" will continue (Table H.9, No.58).

H.4.3/11. An updated edition of the CIAMDA index (H.4.3/3) will be published in 1983 (Table H.9, No.59).

H.4.3/12. The co-ordination of the work of atomic and molecular data centres on the compilation, evaluation, exchange and publication of atomic and molecular data will be reviewed in 1984 (Table H.9, No.60).

H.4.3/13. The collection and evaluation of electron impact ionization, excitation and capture data will continue to be performed within the framework of the CRP (Table H.8, No.11 and Table H.9, No.61).

H.4.3/14. Work will be continued on the development of computer programs for the storage, retrieval and processing of evaluated atomic collision data (Table H.9, No.62).

H.4.3/15. A critical review will be made (Table H.9, No.63) of high-priority atomic collision data; the recommended data will be compiled in a computer-based evaluated atomic collision data file of international reference status.

Co-operation with other organizations

H.4.3/16. This component involves co-operation with atomic data centres in France, the Federal Republic of Germany, Japan, the Soviet Union, the United Kingdom and the United States.

Co-ordinated research programmes

Table H.8

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Positron annihilation in radiation damage studies	3	0	1981	1984
2. Reactor-oriented plasma physics research utilizing small tokamaks	This programme has been approved but no contracts have yet been awarded			
3. Radiation-modified polymers for biomedical and biochemical applications	3	1	1980	1983
4. Production of radiopharmaceuticals from accelerator-produced isotopes	2	7	1976	1983
5. Biomass conversion by radiation processing	This programme has been approved but no contracts have yet been awarded			
6. Chemistry and biochemistry of radiopharmaceuticals	This programme has been approved but no contracts have yet been awarded			
7. Chemical aspects of nuclear methods of analysis	-	2	1981	1986
8. Application of environmental isotope techniques to groundwater problems	4	1	1979	1984
9. Joint IAEA/GSF programme for studying the physical and isotopic behaviour of soil moisture in the zone of aeration	7	0	1980	1983
10. Measurement and analysis of 14-MeV neutron nuclear data needed for fission and fusion reactor technology	This programme has been approved but no contracts have yet been awarded			
11. Atomic collision data for diagnostics of magnetic fusion plasmas	3	3	1981	1983

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table H.9

No.	Document	Users	Source	Year of issue	Paragraph
1.	Report on implantation studies with low-energy accelerators	Secretariat	Consultants	1983	H.1.1/5
2.	Report on nuclear techniques in corrosion studies	As above	Consultants	1984	H.1.1/5
3.	Panel Proceedings: National programmes on applied nuclear physics	Planning organizations; laboratory managers	AG 83/1	1983	H.1.1/6
4.	Technical Report on training and research in nuclear sciences at universities in developing countries	Universities	TC 84/1	1984	H.1.1/8
5.	IAEA-TECDOC on safety and licensing issues related to the conversion of research reactors to LEU fuel	Research reactor operators and regulatory scientists		1983	H.1.2/6
6.	IAEA-TECDOC on status of research reactor instrumentation and control systems	Research reactor operators	AG 84/2	1985	H.1.2/7
7.	Summary report on performance of low-enriched nuclear fuel	As above; Secretariat	TC 84/3	1985	H.1.2/7
8.	Proceedings Series: Use of research reactors for basic research in developing countries	Developing Member States	AG 83/2	1984	H.1.2/8
9.	IAEA-TECDOC on alternatives to research reactors as a research tool	As above	TC 84/4	1985	H.1.2/8
10.	Phase IIa INTOR Workshop report	Planning organizations; national fusion laboratories	AG 83/3 AG 84/5	1984	H.1.3/5
11.	Panel Proceedings: Status of fusion devices	As above		1984	H.1.3/6
12.	Report on auxiliary heating for fusion devices (summary to be submitted to Nuclear Fusion)	IFRC and national fusion programmes	TC 83/4	1983	H.1.3/7
13.	Report on divertor and impurity control in toroidal devices (summary to be submitted to Nuclear Fusion)	As above	TC 83/5	1983	H.1.3/7
14.	Report on plasma confinement and heating in stellerators (summary to be submitted to Nuclear Fusion)	As above	TC 83/6	1984	H.1.3/7

Table H.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
15.	Report on advances in reverse field pinch research (summary to be submitted to Nuclear Fusion)	As above	TC 84/6	1984	H.1.3/7
16.	Report on open confinement systems (summary to be submitted to Nuclear Fusion)	As above	TC 84/7	1985	H.1.3/7
17.	Report on advances in inertial confinement systems (summary to be submitted to Nuclear Fusion)	As above	TC 84/8	1984	H.1.3/7
18.	Proceedings of 10th International Conference on Plasma Physics and Controlled Nuclear Fusion Research	Scientists from fusion and plasma physics laboratories	Conference in 1984	1984	H.1.3/8
19.	IAEA-TECDOC on the use of X-ray and neutron techniques in mineral processing	Research scientists	AG 84/9	1984	H.2.1/5
20.	IAEA-TECDOC on recent advances in electron spectroscopy techniques as analytical probes	As above	TC 84/10	1984	H.2.1/6
21.	Report on role of microprocessors in tracer technology and nucleonic gauging	Industrialists in developing countries	Consultants	1983	H.2.2/10
22.	Report on use of tracers to increase energy utilization efficiency	As above	Consultants	1983	H.2.2/10
23.	IAEA-TECDOC on the use of nuclear techniques for industrial safety and pollution control	Research scientists	AG 83/7	1983	H.2.2/11
24.	IAEA-TECDOC on engineering design for radiation processing systems and related feasibility studies	As above	AG 83/8	1983	H.2.2/11
25.	IAEA-TECDOC on radiation technologies for food irradiation	As above	AG 84/11	1984	H.2.2/12
26.	Volumes 10-14 of "Chemical Thermodynamics of Nuclear Materials"	Scientists and engineers		1983	H.2.3/5
27.	Report on the chemistry of safeguards materials and standards	Secretariat	Consultants	1983	H.2.3/6

Table H.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
28.	Report on advances in nuclear analytical techniques	Research scientists in developing countries	Consultants	1984	H.2.3/6
29.	Report on recent work on the chemistry and biochemistry of radiopharmaceuticals	As above	Consultants	1983	H.2.3/6
30.	Environmental Isotope Data No.8: World Survey of Isotope Concentration in Precipitation	Isotope hydrology institutions in Member States	Data from laboratories in Member States and Agency's Laboratory	1984	H.3.1/3
31.	IAEA-TECDOC on use of tritium for gauging large flow rates	Atomic Energy Commissions; hydrological organizations in Member States	Consultants	1983	H.3.2/4
32.	IAEA-TECDOC on the use of ^{137}Cs in soil erosion and sedimentation studies	As above	Consultants	1984	H.3.2/5
33.	Technical Report with review of hydrological models based on isotope data	Member States	AG 84/12	1984	H.3.3/5
34.	IAEA-TECDOC on intercomparison of stable isotope standards	Stable-isotope laboratories in Member States	AG 83/9	1983	H.3.4/6
35.	Proceedings of symposium on isotope hydrology in water resources development	Atomic Energy Commissions; hydrological organizations in Member States	Symposium in 1983	1983	H.3.4/8
36.	Official Reports of the INDC to the Agency (INDC Report)	Agency Secretariat; nuclear data community	INDC 83/10 and 84/13	1983 and 1984	H.4/2
37.	Computer programs for format translation, validation and checking of evaluated nuclear reaction data	Nuclear data users in developing Member States		1983	H.4.1/10
38.	Report of the meeting of the nuclear reaction data centres (INDC report)	All data centres and groups participating in the nuclear reaction data centre network	Consultants	1983	H.4.1/11
39.	CINDA, Computer Index on Neutron Data	All nuclear data and neutron physicists		1983 and 1984	H.4.1/12
40.	WRENDA, international nuclear data request list (INDC report)	As above		1983	H.4.1/12

Table H.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
41.	Report on evaluation of data for radiation damage of structural materials (INDC report)	Fission and fusion reactor physicists and metallurgists	Consultants	1983	H.4.1/13
42.	Report on status of nuclear data for safeguards (INDC report)	Safeguards units	Consultants	1984	H.4.1/14
43.	Handbook of nuclear data for safeguards (INDC report)	Safeguards units		1983	H.4.1/14
44.	Report on nuclear data used in mining and industry (INDC report)	Applied physicists and engineers in mining and industry	Consultants	1983	H.4.1/15
45.	Revision of Handbook on Nuclear Activation Cross-Sections	Activation analysts		1983	H.4.1/16
46.	Evaluated nuclear data for fusion reactor design calculations (INDC report)	Fusion reactor physicists		1983	H.4.1/17
47.	Technical Report on the current status of standard reference nuclear data	Nuclear physics laboratories	AG 84/14	1985	H.4.1/18
48.	IAEA-TECDOC on the status of basic and applied nuclear level densities	Nuclear physics laboratories	AG 83/11	1984	H.4.1/19
49.	IAEA-TECDOC on the current status of transactinium isotope nuclear data	Nuclear fuel cycle and nuclear physics laboratories and research centres	AG 84/15	1984	H.4.1/19
50.	Status report on the fast-fission cross-section of U-235 (INDC report)	Neutron physics and reactor physics groups; nuclear data centres		1983	H.4.1/20
51.	Compilation of evaluated transactinium isotope neutron nuclear data	Reactor physics and nuclear fuel cycle scientists	CRP	1984	H.4.1/21
52.	Lectures given at the 1984 Course on Nuclear Data Theory and Evaluation	Nuclear data scientists and evaluators	ICTP training course	1985	H.4.1/23
53.	Lectures given at the 1983 training course on the methodology of nuclear data evaluation	Nuclear data evaluators in developing Member States	Technical co-operation course	1984	H.4.1/24
54.	Report on the meeting of the nuclear structure and decay data (NSDD) network (INDC report)	All data centres and groups participating in the NSDD network	Consultants	1984	H.4.2/5

Table H.9

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME (cont.)

No.	Document	Users	Source	Year of issue	Paragraph
55.	Technical Report on recommended heavy-radionuclide nuclear decay data	Nuclear energy laboratories; safeguards, nuclear scientists	CRP	1984	H.4.2/6
56.	Compilation of recommended decay data for radionuclides used as calibration standards	Nuclear physics laboratories; nuclear data scientists		1984	H.4.2/7
57.	Report on the meeting of the IFRC Subcommittee on Atomic and Molecular Data (INDC report)	Secretariat	Cost-free experts	1984	H.4.3/9
58.	International Bulletin on Atomic and Molecular Data for Fusion	Atomic physics and fusion physics communities		1983/ 1984	H.4.3/10
59.	CIAMDA, the computerized index to atomic and molecular collision data	As above		1983	H.4.3/11
60.	Report on the meeting of the A+M Data Centre Network (INDC report)	Data centres and groups participating in A+M Data Centre Network	Consultants	1984	H.4.3/12
61.	Numerical data file of evaluated atomic collision data for fusion and plasma technology	Plasma confinement and fusion reactor physicists	CRP	1983/ 1984	H.4.3/13
62.	Computer programs for the handling of evaluated atomic collision data	As above		1983	H.4.3/14
63.	Reports on the critical evaluation of high-priority atomic collision data (INDC report)	As above	Consultants	1983/ 1984	H.4.3/15

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The references following the meetings are to the relevant paragraph in the programme.

1983	Paragraph
1. Advisory Group on national programmes on applied nuclear physics	H.1.1/6
2. Advisory Group on use of research reactors for basic research in developing countries	H.1.2/8
3. International Tokamak Reactor Workshop	H.1.3/5

1983 (cont.)	Paragraph
4. Technical Committee on auxiliary heating for fusion devices	H.1.3/7
5. Technical Committee on divertor and impurity control in toroidal devices	H.1.3/7
6. Technical Committee on plasma confinement and heating in stellerators	H.1.3/7
7. Advisory Group on nuclear techniques for industrial safety and pollution control	H.2.2/11
8. Advisory Group on engineering design for radiation processing systems and related feasibility studies	H.2.2/11
9. Advisory Group on intercomparison of stable isotope standards	H.3.4/6
10. Thirteenth meeting of the International Nuclear Data Committee	H.4/2
11. Advisory Group on basic and applied nuclear level densities	H.4.1/19

1984	Paragraph
1. Technical Committee on teaching and research in nuclear sciences at universities in developing countries	H.1.1/8
2. Advisory Group on analysis and improvement of instrumentation and control systems for research reactors	H.1.2/7
3. Technical Committee on assessment of the performance of low-enriched nuclear fuel	H.1.2/7
4. Technical Committee on alternatives to research reactors as a research tool	H.1.2/8
5. International Tokamak Reactor Workshop	H.1.3/5
6. Technical Committee on advances in reversed field pinch research	H.1.3/7
7. Technical Committee on open confinement systems	H.1.3/7
8. Technical Committee on advances in inertial confinement systems	H.1.3/7
9. Advisory Group on X-ray and neutron techniques for mineral processing	H.2.1/5
10. Technical Committee on electron spectroscopy techniques in chemical analysis	H.2.1/6
11. Advisory Group on radiation technologies for food irradiation	H.2.2/12
12. Advisory Group on hydrological models based on isotope data	H.3.3/5
13. Fourteenth meeting of the International Nuclear Data Committee	H.4/2
14. Advisory Group on standard reference nuclear data	H.4.1/18
15. Advisory Group on transactinium isotope nuclear data	H.4.1/19

I. THE LABORATORY

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table I.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 451 422
Overtime	22 518
Temporary assistance	15 682
Sub-total	2 489 622
Common staff costs	873 104
Travel	6 970
Representation and hospitality	-
Scientific and technical contracts	9 950
Scientific supplies and equipment	374 998
Common services, supplies and equipment	923 974
Other items of expenditure	5 881
Transfer of costs:	
Translation and records services	5 633
Printing and publishing services	16 575
Data processing services	44 870
Laboratory services	(4 751 577)
TOTAL	-

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 812 000	201 000	20 000	221 000	3 033 000	3 312 000	3 577 000
17 900	1 500	6 000	7 500	25 400	26 500	27 400
12 500	1 000	2 000	3 000	15 500	26 500	27 400
2 842 400	203 500	28 000	231 500	3 073 900	3 365 000	3 631 800
872 000	92 600	6 000	98 600	970 600	1 060 200	1 144 500
14 000	1 500	2 500	4 000	18 000	20 800	21 200
-	-	300	300	300	500	500
18 500	1 000	(6 500)	(5 500)	13 000	14 000	14 500
323 000	42 000	56 000	98 000	421 000	458 000	490 000
916 000	92 000	(68 000)	24 000	940 000	995 000	1 032 000
4 100	400	7 700	8 100	12 200	12 500	12 500
29 000	1 000	(14 000)	(13 000)	16 000	16 000	24 000
19 000	2 000	12 000	14 000	33 000	34 000	37 000
33 000	3 000	-	3 000	36 000	56 000	60 000
(5 071 000)	(439 000)	(24 000)	(463 000)	(5 534 000)	(6 032 000)	(6 468 000)
-	-	-	-	-	-	-

SUMMARY OF MANPOWER

Table I.2

Grade of post	Number of established posts											
	1981 Adjusted		1982		1982 Adjusted		Change	1983		1984 Preliminary estimate		1985 Preliminary estimate	
P-5	4		4		4		-	4		4		4	
P-4	11		11		11		-	11		11		11	
P-3	6		7		7		-	7		7		7	
P-2	3		2		2		-	2		2		2	
P-1	1		1		1		-	1		1		1	
Sub-total	25		25		25		-	25		25		25	
GS	60	(2)	[a] 59	(2)	59	(2)	1	60	(2)	60	(2)	60	(2)
M&O	27	(7)	27	(7)	27	(7)	-	27	(7)	27	(7)	27	(7)
TOTAL	112	(9)	111	(9)	111	(9)	1	112	(9)	112	(9)	112	(9)

[a] FAO staff in brackets

CHANGES IN COSTS AND MANPOWER

Costs

I/1. As will be seen from Table I.1 above, the cost of the Laboratory's services is allocated to the programmes for which they are provided. The total cost of these services is expected to increase by $463 000 as a result of salary and other price increases of $439 000 and a programme increase of $24 000.

I/2. A programme increase of $26 000 in respect of salaries and common staff costs is attributable to the addition of one GS post for a mass spectrometer operator. Further programme increases will be required in respect of overtime ($6000), temporary assistance ($2000), travel ($2500), hospitality ($300), scientific supplies and equipment ($56 000) and "Other items of expenditure" ($7700, for training activities). Programme decreases will be possible in respect of scientific and technical contracts ($6500) and common services, supplies and equipment ($68 000).

I/3. As regards the allocation of service costs, the programme increase in printing and publishing services ($12 000) is offset by a programme reduction in respect of linguistic services ($14 000).

I/4. It is expected that income from the provision of laboratory services will amount to $110 000 in 1983.

Manpower

I/5. As will be seen from Table I.2 above, the addition of one GS post is foreseen for 1983. A detailed justification is provided in Annex IV.

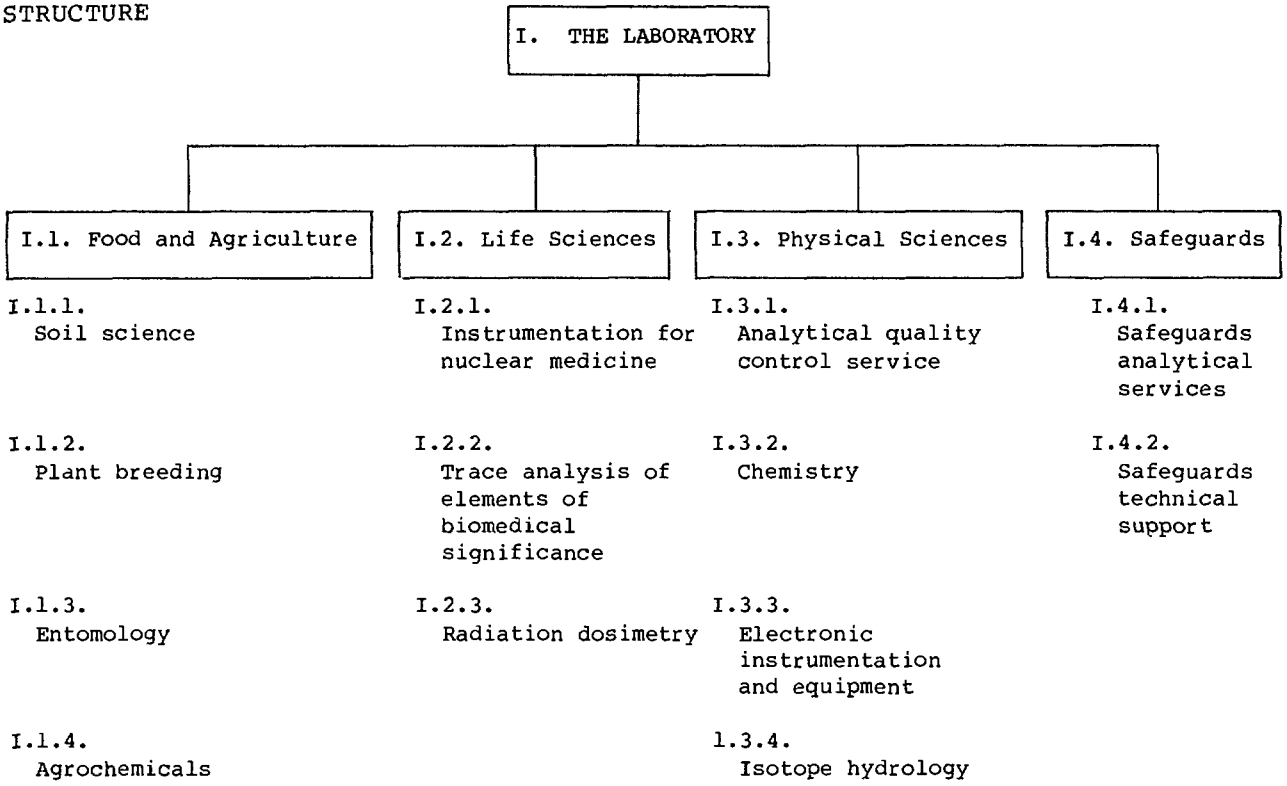
I/6. No further changes in manpower are foreseen for 1984 and 1985.

THE PROGRAMME

OBJECTIVE

I/7. The objective is to give support, through such activities as the provision of analytical services, the development of techniques and the provision of training, to the Agency's regular technical programmes (including safeguards) and its technical co-operation programme.

STRUCTURE



I/8. The structure of the "Laboratory" programme has been revised since the previous presentation (GC(XXIV/630) in order to show more clearly the relationship of the various activities to the Agency's other programmes. The new structure is shown in Table I.3 and the chart.

SUB-PROGRAMME I.1

Food and agriculture

OBJECTIVE

I.1/1. The objectives of the Laboratory are closely integrated with those of the "Food and Agriculture" programme. To attain these objectives, the Laboratory provides training, services and methodological research, mainly in support of co-ordinated research programmes.

PROGRAMME TRENDS FOR 1983-84

I.1/2. The usefulness of nuclear techniques in soil-plant research is well established and the relevant work under the "Food and Agriculture" programme continues to rely on the Laboratory for support, especially during the early stages of projects.

Apportionment of total laboratory costs to relevant sub-programmes

Table I.3

Laboratory Sub-programme	Allocated to Programme/ subprogramme	1983 Estimate			
		Man-years			Costs
		P	GS	M&O	
Food and agriculture					
Soil science	F.1	2.1	2.9	1.8	338 000
Plant breeding	F.2	2.1	3.9	3.7	351 000
Entomology	F.4	4.1	3.2	4.0	665 000
Agrochemicals	F.5	-	0.4	0.5	50 000
Sub-total		8.3	10.4	10.0	1 404 000
Life sciences					
Instrumentation for nuclear medicine	G.1	1.0	-	-	110 000
Trace analysis of elements of biomedical significance	G.1	1.1	5.1	2.2	315 000
Radiation dosimetry	G.2	-	1.1	0.3	227 000
Sub-total		2.1	6.2	2.5	652 000
Physical sciences					
Analytical quality control service	H.2	2.1	5.8	1.6	604 000
Chemistry	H.2	1.0	2.2	0.7	300 000
Electronic instrumentation and equipment	H.2	2.0	8.8	2.9	760 000
Isotope hydrology	H.3	4.1	10.5	1.1	647 000
Sub-total		9.2	27.3	6.3	2 311 000
Safeguards					
Safeguards analytical services	L.2	5.1	15.0	7.7	1 100 000
Safeguards technical support	L.2	0.3	1.1	0.5	67 000
Sub-total		5.4	16.1	8.2	1 167 000
TOTAL		25.0	60.0	27.0	5 534 000

1984 Preliminary estimate				1985 Preliminary estimate			
Man-years			Costs	Man-years			Costs
P	GS	M&O		P	GS	M&O	
2.1	2.9	1.8	368 000	2.1	2.9	1.8	395 000
2.1	3.9	3.7	383 000	2.1	3.9	3.7	410 000
4.1	3.2	4.0	725 000	4.1	3.2	4.0	777 000
-	0.4	0.5	54 000	-	0.4	0.5	58 000
8.3	10.4	10.0	1 530 000	8.3	10.4	10.0	1 640 000
1.0	-	-	120 000	1.0	-	-	129 000
1.1	5.1	2.2	343 000	1.1	5.1	2.2	368 000
-	1.1	0.3	248 000	-	1.1	0.3	265 000
2.1	6.2	2.5	711 000	2.1	6.2	2.5	762 000
2.1	5.8	1.6	658 000	2.1	5.8	1.6	705 000
1.0	2.2	0.7	327 000	1.0	2.2	0.7	351 000
2.0	8.8	2.9	828 000	2.0	8.8	2.9	888 000
4.1	10.5	1.1	706 000	4.1	10.5	1.1	757 000
9.2	27.3	6.3	2 519 000	9.2	27.3	6.3	2 701 000
5.1	15.0	7.7	1 200 000	5.1	15.0	7.7	1 285 000
0.3	1.1	0.5	72 000	0.3	1.1	0.5	80 000
5.4	16.1	8.2	1 272 000	5.4	16.1	8.2	1 365 000
25.0	60.0	27.0	6 032 000	25.0	60.0	27.0	6 468 000

I.1/3. There is a continuing demand from Member States for mutation induction services involving the irradiation of seed samples and for information about the comparative merits of this treatment and the use of chemical mutagens. The Laboratory will study problems connected with chimeras resulting from seed irradiation, with the aim of increasing the probability of identifying useful mutants. Advice and training will be offered to Member States interested in applying irradiation techniques to plant breeding problems.

I.1/4. The SIT (sterile-insect technique) is now established as an important component in large-scale insect control field programmes, its merits being high specificity, effectiveness and environmental acceptability. The Laboratory will continue to give support to projects in Member States aimed at establishing full-scale SIT programmes.

I.1/5. The continuing need for increased agricultural production means that effective and safe use must be made of agrochemicals. Laboratory work related to pesticides is being strengthened to provide more adequate support to programmes on the effective and safe use of pesticides, with emphasis on simple technologies applicable in developing countries.

Laboratory services: Breakdown of costs by programme

Table I.4

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Food and agriculture	1 427 980	1 291 000	1 404 000	1 530 000	1 640 000
Life sciences	643 405	599 000	652 000	711 000	762 000
Physical sciences	1 934 178	2 113 000	2 311 000	2 519 000	2 701 000
Safeguards	746 014	1 068 000	1 167 000	1 272 000	1 365 000
TOTAL	4 751 577	5 071 000	5 534 000	6 032 000	6 468 000

Soil science (component I.1.1)

Objective

I.1.1/1. As an integral part of the "Soil fertility, irrigation and crop production" sub-programme (F.1), this component has as its objective to provide relevant training, to carry out isotopic analyses, to prepare and distribute labelled fertilizers, and to develop techniques for following the fate of fertilizer and symbiotically-fixed nitrogen in soil-plant systems.

Results to date

I.1.1/2. Analytical services have been provided for studies of the efficient use of nitrogen and phosphorus fertilizers and of the symbiotic fixation of nitrogen by legume crops. Some 10 000 to 15 000 samples from field experiments in developing Member States have been analysed for nitrogen-15 each year.

I.1.1/3. Field and greenhouse experiments have been carried out in support of the programmes on symbiotic nitrogen fixation and multiple cropping systems.

I.1.1/4. Microbiological and gas-chromatographic methods giving valuable information about microbiological processes in the soil-plant system have been

developed. This work complements the isotope-aided aspects of the CRPs on symbiotic nitrogen fixation and multiple cropping.

I.1.1/5. In 1980 and 1981, interregional training courses were conducted at the Laboratory on the use of isotopes and radiation techniques in studies of soil-plant relationships.

I.1.1/6. Currently, six to eight Agency fellows a year spend periods of three months or more in the Agriculture Section of the Laboratory to undergo training in the use of isotope and radiation techniques in crop nutrition studies.

Plans for 1983-84

I.1.1/7. The Laboratory will carry out routine nitrogen-15 analyses as required by the relevant CRPs (see paragraphs F.1.1/3-5) at about the same level as at present. The instrumentation used will be improved: in particular, an optical spectrometric method will be modified to make it more suitable for transfer to developing countries. The training activities will be increased. An interregional training course will be held at the Laboratory every year.

I.1.1/8. Field and greenhouse work will be initiated in support of CRPs dealing with mixed cropping and pasture systems (see paragraph F.1.1/4). The effect of mycorrhiza on nitrogen and phosphorus mobilization in soil will be studied in greenhouse experiments in support of a CRP (see paragraph F 1.3/5).

Plant breeding (component I.1.2)

Objective

I.1.2/1. As an integral part of the "Plant breeding and genetics" sub-programme (F.2), this component has as its objective to provide training and irradiation and analytical services for seed and plant material, and to develop methods for mutation induction for improved yield and quality.

Results to date

I.1.2/2. Fast analytical methods for the selection of high-protein mutants of cereals such as wheat, barley, rice and millet have been investigated. It has proved possible to determine total protein and the amounts of certain amino-acids in seed materials at a rate of 800 samples per day by means of semi-automatic and fully automatic methods.

I.1.2/3. Methodological studies on the efficiency of the induction of mutations for protein improvement in wheat have succeeded in identifying mutant lines with improved seed protein content but have led to the conclusion that such changes occur with a much lower frequency than in diploid cereal species (such as barley or rice).

I.1.2/4. In view of the increasing world-wide interest in grain legume improvement, investigations into the response of legume seed species to various mutagens have been initiated. Suitable dose ranges determined for certain species have been announced in the Mutation Breeding Newsletter.

I.1.2/5. In 1982, an interregional training course was organized (with the support of SIDA) on the induction and the use of mutations in plant breeding.

Plans for 1983-84

I.1.2/6. Seed irradiation and analytical services will continue to be provided at about the existing level. Analytical procedures will be developed as necessary (to simplify nitrogen-15 measurements, for example). The

existence of the new greenhouse will make it possible to provide increased training in mutation induction and utilization.

I.1.2/7. Protein analyses will be carried out for research contractors and for the follow-up to the FAO/IAEA/GSF/SIDA Seed Protein Improvement Project (see Table F.11, No.6).

Entomology (component I.1.3)

Objective

I.1.3/1. As an integral part of the "Insect and pest control" sub-programme (F.4), this component has as its objective to provide training and to develop methods for applying the sterile-insect technique (SIT) against phytophagous and hematophagous insects and for using isotopes and radiation to solve specific important pest management problems.

Results to date

I.1.3/2. Procedures and equipment (incorporating automated operation and other labour-saving features) have been developed for the mass rearing of medflies in support of the Mexican field programme, under which a large-scale mass-rearing facility (with a capacity of 500 million flies per week) was put into operation in 1978.

I.1.3/3. Methods for the mass rearing of tsetse flies using *in vivo* feeding techniques have been developed. *In vitro* feeding equipment and procedures of a novel type (now used in tsetse fly research laboratories in several countries) have been developed. The relevant technologies were transferred in 1979 to the BICOT project in Nigeria and made available to other interested Member States.

I.1.3/4. Since May 1981, the isotope laboratory has been authorized for operation under a Type C license. This facility has been used to initiate research and training in the use of isotopes in ecological studies of the tsetse fly and the brown plant hopper (a major rice pest).

I.1.3/5. Twenty-eight man-months of fellowship training have been provided in support of field programmes in developing Member States.

Plans for 1983-84

I.1.3/6. Research into genetic sexing mechanisms for fruit flies (to eliminate unwanted female flies at an early stage of their development) will be carried out in an attempt to identify an effective technique. The results will be made available to Member States.

I.1.3/7. On the basis of the experience accumulated, advice concerning new designs for medfly mass-rearing facilities will be given to Member States wishing to build up their own capacity.

I.1.3/8. Research will be carried out on the development of more efficient mass-rearing techniques for the tsetse fly through the improvement of cage design, diet formulations and irradiation methods.

I.1.3/9. The BICOT project will continue to be supported with back-up colonies and freeze-dried blood supplies and the provision of advice and training. It is expected that such support will continue to be needed until about 1985. Advice will also be given on methods for comparing the quality of mass-reared and wild insects.

I.1.3/10. Isotope tagging and tracer methods will be developed and training in their use for ecological and physiological studies with hematophagous and phytophagous insects will be provided.

New developments foreseen for 1985-88

I.1.3/11. Studies to develop the technology of F_1 sterility for the control of Lepidoptera and Coleoptera will be initiated. Questions of host/pest specificity in animal and plant systems will be investigated with isotope techniques. Mass-rearing techniques and genetic sexing procedures will be developed for hematophagous vectors of animal diseases (such as mosquitoes or ticks).

Co-operation with other organizations

I.1.3/12. Co-operation has been maintained with WHO, UNEP, OAU, IEMVT, US-AID, GSF, ILRAD, ICIPE, SIDA, ODA, USDA and national pest control organizations.

Agrochemicals (component I.1.4)

Objective

I.1.4/1. As an integral part of the "Agrochemicals and residues" sub-programme (F.5), this component has as its objective to provide training and to develop simple analytical techniques related to the solution of pesticide residue problems in developing countries.

Results to date

I.1.4/2. Procedures and equipment have been developed for radioisotope studies on the efficacy of insecticides against the tsetse fly and for optimizing the use of pesticides applied to soil or seeds (in particular bean and rice crops).

Plans for 1983-84

I.1.4/3. Support will be given to CRPs and technical co-operation projects dealing with the use of pesticides in developing countries to achieve optimum control with least damage to the environment. Special attention will be given to endosulfan as an insecticide against the tsetse fly.

I.1.4/4. Simple, rugged nuclear measuring procedures which can be applied effectively in field-work for determining the fate and efficacy of pesticides will be developed.

I.1.4/5. Procedures for studying residue breakdown by mutated microorganisms to convert agricultural wastes into animal feed will be investigated.

I.1.4/6. Training will be provided for scientists from developing Member States.

SUB-PROGRAMME I.2

Life sciences

OBJECTIVE

I.2/1. The objective is to provide laboratory services in support of the "Life Sciences" programme of the Agency, mainly in matters relating to nuclear medicine, radiation dosimetry and electronic instrumentation.

PROGRAMME TRENDS FOR 1983-84

I.2/2. The proper maintenance and repair of electronic instrumentation necessary for the practice of nuclear medicine has proved to be a serious problem in developing countries. The Laboratory will continue to help by analysing the problem in different countries, selecting appropriate equipment for stabilizing power supplies, training service technicians, providing a spare-parts replacement service, and negotiating with manufacturers for the production of simple and reliable equipment.

I.2/3. The assessment of trace elements of biomedical significance in foodstuffs and body fluids is a problem of some importance. The Laboratory will continue to support CRPs aimed at the accurate assay of such elements.

I.2/4. Accurate radiation dosimetry remains a central problem in the treatment of cancer by radiotherapy and in protective health physics. In response to many requests from Member States, the Laboratory provides calibration services in both these fields, and also acts as the reference centre for the Network of Secondary Standard Dosimetry Laboratories (SSDLs). Some of these SSDLs are themselves national centres for the calibration of radioactive solutions: this is especially important if there is a radioisotope production programme in the country concerned. As the reference centre for the SSDL Network, the Laboratory may organize intercomparisons to check the accuracy of such national calibrations.

Instrumentation for nuclear medicine (component I.2.1)

Objective

I.2.1/1. The objective is, with regard to developing countries: (a) to evaluate nuclear medicine instrumentation from the point of view of suitability and where necessary and feasible to adapt it; (b) to stimulate the implementation of improved strategies for the maintenance and repair of nuclear medicine instruments; and (c) to provide training for trainers in instrument maintenance.

Results to date

I.2.1/2. Five prototype automatic well scintillation counters of simple and novel design were built in the Laboratory and field-tested for their suitability in developing countries; commercial production of additional units has been promoted. Electrical power-conditioning devices to overcome mains supply fluctuations have been built and/or evaluated. Advice is being given on their installation for the protection of nuclear instruments in laboratories in developing countries. Support was given to CRPs on maintenance in 13 countries and to technical co-operation projects in 28 countries. Support was also given to regional training courses for electronics maintenance personnel or trainers of such personnel; indirect support was given to three national courses.

Plans for 1983-84

I.2.1/3. In connection with technical co-operation projects, evaluations will be made of nuclear medicine instruments intended for service under conditions found in developing countries. Adaptations of the equipment will be made where necessary and feasible.

I.2.1/4. Technical support will be given to the CRPs and technical co-operation projects on instrument maintenance and to the spare-part pilot project (see paragraphs G.1.1/8 and 10). It is hoped the Laboratory itself may be able to establish a comparable spare-part project covering a specified range of instruments.

Trace analysis of elements of biomedical significance (component I.2.2)

Objective

I.2.2/1. The objective is to intercompare and assist in improving nuclear analytical techniques as applied in co-ordinated research programmes on trace elements in foodstuffs, occupational health, daily dietary intakes of essential and toxic mineral elements, and health-related environmental research, and, in response to requests from laboratories in Member States, to provide (as part of component I.3.1) analytical quality control materials, to prepare new materials, and to develop and apply procedures for use in interlaboratory comparisons.

Results to date

I.2.2/2. The Laboratory has prepared and supplied various kinds of analytical quality control materials in support of a number of different CRPs. It has acted as a receiving/distributing centre for the joint WHO/IAEA research project on trace elements in human milk (completed in 1982) and has been responsible for approximately 10 000 analyses of samples over a period of three years. These were carried out partly in the Laboratory at Seibersdorf (for 8 elements) and partly in other analytical laboratories (a further 16 elements). Computerized data files of the results have been established and maintained. Services on a similar scale were provided in support of a WHO/IAEA research programme on trace elements in cardiovascular diseases.

I.2.2/3. Analytical quality control materials have been provided on request to interested laboratories in Member States (181 recipients in 43 Member States in 1980; 273 recipients in 42 Member States in 1981). Activation analysis is the most important trace analysis technique used for the certification of these materials, which include animal muscle (certified in 1980), human hair (1981) and animal bone (1982). Reports on these materials have been issued.

I.2.2/4. The Laboratory has co-ordinated an exercise involving measurements of cadmium in kidney by neutron activation analysis in connection with a programme on biological monitoring organized by WHO and UNEP. Twenty different quality control materials used in this programme have been studied.

Plans for 1983-84

I.2.2/5. Services will continue to be provided in support of a CRP under the "Life Sciences" programme (see paragraph G.1.4/6), particularly through the supply of analytical quality control materials and any small items of equipment that may be required. These services are expected to be provided on an increased scale, especially in support of technical co-operation and training projects.

I.2.2/6. The quality of existing certified reference materials will be upgraded by new measurements permitting the certification of additional elements (particularly As, Co, Cr, Mo, Ni and Sb). Three new analytical quality control materials - horse kidney, mixed human diet and human hair - will be used in inter-laboratory comparisons and will be certified. These will subsequently be made generally available through the Laboratory's analytical quality control service (I.3.1/3).

I.2.2/7. The feasibility of preparing quality control materials from blood serum will be investigated.

I.2.2/8. Measurements of $^{13}C:^{12}C$ isotopic ratios may be started in support of a new CRP (see paragraph G.1.3/7) on applications of stable-isotope tracers in medical research.

Related activities

I.2.2/9. Many of the services mentioned above form part of the Laboratory's analytical quality control service (component I.3.1). Some parts of the work are related to component G.4.1.

I.2.2/10. A whole-body counter constructed in the Laboratory is operated as a service to operationally exposed staff - in particular safeguards inspectors. Some 400 whole-body measurements are made annually. This number will increase in line with the growth in safeguards work.

New developments foreseen for 1985-88

I.2.2/11. A new project on the modifying role of trace elements in relation to environmental carcinogens may be started in collaboration with IARC.

Co-operation with other organizations

I.2.2/12. The Laboratory already serves as a WHO reference centre for mineral and trace element studies in human nutrition and has collaborated with UNEP in connection with the biological monitoring of cadmium. Collaboration of this kind is expected to continue, possibly also with other United Nations organizations such as IARC. Collaboration will also be maintained with standardizing institutions such as the United States National Bureau of Standards.

Radiation dosimetry (component I.2.3)

Objective

I.2.3/1. As an integral part of the "Dosimetry for intentional radiation exposures" sub-programme (G.2), this component has as its objective to help improve the accuracy and precision of dosimetry (particularly in developing countries) for radiation therapy, radiation protection and radiation processing by:

(a) providing a postal dose service for cobalt-60 and X-ray dosimetry in radiotherapy institutes; and
(b) giving assistance to the laboratories in the Secondary Standard Dosimetry Laboratory (SSDL) Network by organizing intercomparisons, developing equipment and providing training.

Results to date

I.2.3/2. With the co-operation of WHO and its regional offices, some 150 intercomparisons for cobalt-60 dosimetry are performed annually with individual radiotherapy institutes. In 1982 this service was extended to orthovoltage X-rays, for which some 50 intercomparisons were carried out.

I.2.3/3. An intercomparison of cobalt-60 dosimetry among 22 members of the SSDL Network was performed by the Laboratory and the results published in 1982. The average deviation was less than $\pm 2\%$. In a Fricke intercomparison organized by the BIPM, the average deviation between the Laboratory values and those of the BIPM was 0.2%.

I.2.3/4. A precise calibration cart-rail system using readily available components has been designed and constructed. A remote-control fast shutter for X-ray calibrations has been improved and modified for use with voltages up to 320 kV.

I.2.3/5. A method for using thermoluminescent dosimeters (TLDs) for the intercomparison of photons and electrons with energies up to 25 MeV has been developed.

I.2.3/6. Training has been given to SSDL personnel from Indonesia and Venezuela.

Plans for 1983-84

I.2.3/7. It is expected that the number of cobalt-60 measurements for radiotherapy institutes will decrease as this service is gradually taken over by the SSDLs. However, an increase is expected in the measurements for X-rays and high-energy photons and electrons.

I.2.3/8. Cobalt-60 and X-ray dosimetry intercomparisons will be organized annually among the members of the SSDL Network.

I.2.3/9. Following tests in 1982, an automated read-out system for the TLD samples used in the postal dose intercomparison will be purchased and put into operation.

I.2.3/10. Training will be given as required to SSDL personnel.

I.2.3/11. The graphite calorimeter constructed for the Agency by the Forschungszentrum Seibersdorf will be put into operation. This will provide further assurance of the accuracy of the Laboratory's measurements and will act as a prototype for use in advanced SSDLs.

I.2.3/12. To meet the increasing need for reliable dosimetry in industrial radiation processing, a postal dose intercomparison service for high doses will be developed. This is expected to involve about twelve laboratories in a once-a-year exercise.

New developments foreseen for 1985-88

I.2.3/13. Improvements will be made in intercomparison methods and dosimetry standards. The absorbed dose water calorimeter may become the primary standard in radiotherapy and the Laboratory could assist with its introduction into the SSDL Network. The development of dosimetry systems for neutrons (at both radiation protection and radiotherapy levels) and for heavy charged particles in radiotherapy may become necessary.

Co-operation with other organizations

I.2.3/14. Close co-operation will continue with the United Kingdom National Physical Laboratory, the Austrian Forschungszentrum Seibersdorf and the Hungarian National Office of Measures as well as with the members of the SSDL Network.

SUB-PROGRAMME I.3

Physical sciences

OBJECTIVE

I.3/1. The objective is to provide laboratory services in support of the "Physical Sciences" programme.

PROGRAMME TRENDS FOR 1983-84

I.3/2. The accuracy of activation methods and other trace-element analysis techniques (used in the assay of ores for rare minerals and the analysis of biological materials for heavy-metal content) can be greatly improved through the use of certified reference materials. For many years the Laboratory has been preparing, certifying and distributing such materials. The demand for them is growing and will be met by the introduction of new materials, analysed for a greater number of elements.

I.3/3. Methods for the chemical analysis of trace-level elements have been developed in the Laboratory and are used to assist developing Member States in setting up prospecting programmes for uranium or thorium ores. Samples collected during the early stages of prospecting are usually sent to the Laboratory for analysis, but emphasis is placed on building up analytical facilities in the country concerned.

I.3/4. The Electronics Group in the Laboratory provides a necessary service to other groups and also supports training activities.

I.3/5. The Isotope Hydrology Section is involved with making analyses on behalf of Member States and assisting them to establish their own analytical facilities.

Analytical quality control service (compoment I.3.1)

Objective

I.3.1/1. The objective is to assist laboratories in Member States to achieve and maintain a high level of reliability in analytical work by organizing and evaluating analytical intercomparisons and providing standardized reference materials containing known concentrations of elements of interest.

Results to date

I.3.1/2. During the period 1977-81, 40 intercomparisons were organized to check the validity of analytical procedures used in nuclear and isotope measurements, nuclear fuel technology, safeguards, radioactive waste disposal, environmental protection, geology and hydrology (see also I.2.2/3). An average of 40 laboratories participated in each. This has involved contacts with laboratories in 61 Member States and the shipment of several thousand intercomparison samples. In addition, outside laboratories have ordered a total of some 3000 samples of certified or uncertified reference materials from the Laboratory (which were supplied against a small charge to recover the direct cost of their preparation and mailing). Reports on various aspects of this work have been published in scientific journals and internal reports and in the form of papers presented at technical or scientific meetings. Recommendations on new materials to be included in the programme were made by consultants in 1981.

Plans for 1983-84

I.3.1/3. Additional uranium and thorium ores of three different concentrations will be made available as reference materials. Some of these have already been prepared with the assistance of laboratories in Member States and will be certified by a process involving analysis at the Laboratory and the use of concentration values reported by outside laboratories during intercomparisons. Other areas to be covered will be trace-element geology and pollution management (the latter particularly in relation to the marine environment). Efforts will be concentrated on intercomparisons resulting in the production of new certified reference materials for which costs can be recovered through sales.

Co-operation with other organizations

I.3.1/4. Contacts have been established and will be maintained with WMO, WHO, FAO, UNEP, ISO/REMCO, IUPAC, OIML, ICRM, the International Working Group on Geological Reference Materials and national laboratories engaged in the production and certification of reference materials.

Chemistry (component I.3.2)

Objective

I.3.2/1. The objective is to provide support to technical co-operation programmes relating to uranium exploration, through the analysis of samples and the organization and provision of training and advice to Member States.

Results to date

I.3.2/2. During the period 1980-81, some 3300 determinations of uranium, thorium and some other elements were performed on 560 samples (mainly rock, soils or sediments) received from projects in 11 countries.

I.3.2/3. Greater emphasis has been placed in the last few years on assisting Member States to set up their own analytical facilities. A mission was undertaken for this purpose to Colombia in 1981.

I.3.2/4. On-the-job training in uranium analysis was provided to Agency fellows from Colombia, Peru and the Philippines during 1980 and 1981. Lectures were given at a regional training course for laboratory workers in Ghana.

Plans for 1983-84

I.3.2/5. Prospecting samples will continue to be analysed as required. Advisory missions will be undertaken on request. Laboratories in Member States will be assisted to set up their own facilities for the analysis of uranium and thorium samples, in some cases with the aid of equipment provided through Agency technical co-operation programmes and UNDP.

Related activities

I.3.2/6. Some 200 urine samples are analysed annually for plutonium-239 content in the routine testing of Agency safeguards inspectors who may have been exposed to plutonium in the course of their work.

New developments foreseen for 1985-88

I.3.2/7. Training and support for training courses will increase. The number of laboratories capable of dealing with the analysis of uranium prospecting samples will increase; this will change the nature of the assistance required from routine analysis to the provision of certified reference materials and intercalibration work.

Electronic instrumentation and equipment (component I.3.3)

Objective

I.3.3/1. The objective is to provide electronics design, construction and servicing facilities; to design and build electronic equipment for other sections of the Laboratory; and to support training programmes in the field of electronics.

Results to date

I.3.3/2. Electronic instruments have been designed, built, modified or repaired to meet the needs of the Laboratory.

I.3.3/3. In support of the "Life Sciences" programme, prototypes of simple, inexpensive and stable nuclear equipment suitable for use in hospitals in developing countries have been produced.

I.3.3/4. An automatic pipetting system has been developed to speed up uranium analytical work in the Safeguards Analytical Laboratory (SAL).

I.3.3/5. An electronics technician spent two months as a tutor on a training course on nuclear instrumentation; a scientist from Bulgaria was trained in the Laboratory for one month in a special interfacing technique. Equipment specifically intended for training purposes has been designed and constructed.

Plans for 1983-84

I.3.3/6. Services to other sections of the Laboratory and of the Agency will continue at about the same level.

I.3.3/7. More training will be offered. Participation by technicians in the Agency's training courses will be increased.

Isotope hydrology (component I.3.4)

Objective

I.3.4/1. The objective is to provide analytical services in support of the "Isotope hydrology" sub-programme (H.3).

Results to date

I.3.4/2. During the period 1978-81, about 7000 oxygen-18, 7000 deuterium, 2500 tritium and 600 carbon-14 analyses were performed for the IAEA/WMO "Isotopes in Precipitation" survey and for field projects in Member States. In the same period, about 600 chemical analyses of natural water were performed as a complement to isotopic analyses.

I.3.4/3. Several Member States received help in setting up their own analytical facilities - advice on equipment testing and calibration and training of scientists and technicians.

Plans for 1983-84

I.3.4/4. The above activities will continue (see paragraphs H.3.1/3, H.3.3/4 and H.3.3/6), with increased use being made of automation and on-line microcomputers. It is expected that about 4000 stable-isotope analyses, 500 tritium and 150 carbon-14 determinations, and about 300 chemical analyses of water samples will be made per year.

I.3.4/5. Training will be provided for scientists and technicians from Member States setting up their own hydrology laboratories and applying isotope methods in water studies.

I.3.4/6. The Laboratory will continue its co-operation with CRPs on groundwater dating methods related especially to high-level active waste disposal in geological formations (see paragraph H.3.3/6).

Related activities

I.3.4/7. Assistance will be given with the installation of new laboratory facilities for water isotope analysis in Member States (see paragraph H.3.4/12).

New developments foreseen for 1985-88

I.3.4/8. In connection with the assessment and development of geothermal resources in Member States (see paragraph H.3.3/9), the laboratory facilities will be extended to the analysis of gases dissolved in water.

Co-operation with other organizations

I.3.4/9. Co-operation is maintained with WMO, FAO, UNDP and UN-DTCD.

SUB-PROGRAMME I.4

Safeguards

OBJECTIVE

I.4/1. The objective is to provide the Agency with its own laboratory for carrying out chemical and isotopic analyses of safeguards samples and to assist the "Safeguards" programme by training inspectors and providing practical technical support.

PROGRAMME TRENDS FOR 1983-84

I.4/2. The analytical services provided by the Laboratory are fundamental to the safeguards activities of the Agency. In addition to analysing samples brought in by inspectors, the Laboratory gives expert advice about the accuracy achievable in such analyses, and plays an important part in the international information exchange in this field. It organizes the distribution of samples to laboratories in other countries which provide back-up facilities when the Agency's own Laboratory is overloaded ("network" laboratories).

I.4/3. Continued improvements will be made in the equipment and methodology of the Laboratory, but it is approaching the limits of its capacity and increasing use will have to be made of analyses carried out in network laboratories.

I.4/4. The Laboratory provides the essential technical infrastructure for the Agency's inspection programme, by making available services in its mechanical and electronics workshops, providing laboratory space for inspector training and instrument calibration, and ensuring the secure storage of the nuclear materials used in the safeguards programme.

Safeguards analytical services (component I.4.1)

I.4.1/1. The objective is: to carry out chemical and isotopic analyses of safeguards samples; to assist in the application and development of non-destructive assay (NDA) techniques by characterizing test samples and testing NDA equipment; to participate in international efforts for maintaining and improving the quality of safeguards analytical work; to contribute to the improvement of sampling procedures and measuring systems; and to assist in the training of safeguards inspectors.

Results to date

I.4.1/2. The Safeguards Analytical Laboratory (SAL) at Seibersdorf was licensed for operation in July 1979 and is now working at close to full capacity. In 1981 there was an overall increase of 21% (compared to 1980) in the number of samples analysed. The figures for 1981 were (1980 figures in brackets): 658 samples containing uranium (465); 122 samples containing plutonium (106); and 166 spent fuel solution samples (212).

I.4.1/3. Improved procedures using smaller quantities have been developed to ease the problems of transporting safeguards samples by air.

I.4.1/4. Field tests carried out within the framework of technical support programmes have established the usefulness of the resin bead technique for analysing spent fuel solutions.

I.4.1/5. In 1981 a new automatic mass spectrometer donated by the United Kingdom was installed and brought into use.

I.4.1/6. A minicomputer has been installed for managing the analysis of samples and recording the results. The minicomputers in use in SAL are being combined into a co-ordinated network for which software is now being written.

I.4.1/7. One analyst from the national safeguards authority of a developing country was given training in SAL in 1981.

Plans for 1983-84

I.4.1/8. Measures will be taken with a view to reducing the delay that occurs between sampling and the reporting of the analytical results - the objective being a 10-day period. These will include:

(a) Introduction of rapid procedures for shipping samples and redistributing them to network laboratories where necessary;
(b) Ensuring full exploitation of the new automatic mass spectrometer;
(c) Implementing the resin bead technique in reprocessing plants.

I.4.1/9. The management of samples under analysis, the reporting of results and the co-ordination of quality assurance programmes will be fully computerized using the Laboratory's own minicomputer network.

I.4.1/10. Analytical techniques necessary for the work of the Laboratory will be developed further - especially plutonium emission spectrography, gravimetry, coulometry, mass spectrometry, alpha-spectrometry, and isotopic and isotope dilution analysis.

I.4.1/11. The need for a gas-source mass spectrometer will be examined and consideration given to the replacement of other major items of analytical equipment.

I.4.1/12. The Laboratory will continue to characterize the standards used for checking the accuracy of NDA methods.

I.4.1/13. Advice and training will be offered to Member States wishing to set up national safeguards analytical facilities.

Related activities

I.4.1/14. The possibility of additional office space for data-processing work is being investigated.

New developments foreseen for 1985-88

I.4.1/15. The further development of NDA techniques for field measurements will require a substantial increase in the characterization work.

Safeguards technical support (component I.4.2)

Objective

I.4.2/1. The objective is to provide mechanical and electronics workshop facilities in order to support safeguards analytical work at the Laboratory and safeguards operations in general.

Results to date

I.4.2/2. The Laboratory's electronics workshop has designed and built automated titration equipment which has greatly increased SAL's capacity for uranium analyses. Prototypes have been built of a device to monitor plutonium in cuts or wounds and of a counting assembly with an automatic sample-changer for smear and wipe tests.

I.4.2/3. The electronics laboratory has regularly modified or improved electronic and surveillance equipment used by safeguards inspectors and has provided maintenance services.

I.4.2/4. In 1981, the Laboratory's mechanical workshop designed and built a prototype sealable storage rack for the secure storage of fuel elements in a fuel storage pond.

I.4.2/5. The mechanical workshop contributed significantly to the fitting-out of SAL and it continues to provide a general supporting service, maintaining and manning a small local workshop within SAL's active area.

Plans for 1983-84

I.4.2/6. Electronics workshop support will continue at the present level, but the need for mechanical work will increase in connection with the growing use of installed safeguards equipment.

J. INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table J.1

Item of expenditure	1981 Actual obligations
Other items of expenditure	776 000
Printing and publishing services	76 669
TOTAL	852 669

SUMMARY OF MANPOWER

Table J.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
P-5	1	1	1	1	2	2	2
P-4	2	2	2	(1)	1	1	1
P-3	2	2	2	-	2	2	2
Sub-total	5	5	5	-	5	5	5
GS	17	17	17	-	17	18	19
TOTAL	22	22	22	-	22	23	24

CHANGES IN COSTS AND MANPOWER

Costs

J/1. Table J.1 above shows the Regular Budget contribution towards the financing of the Trieste Centre. It consists of a basic contribution and of a contribution to meet publishing costs. It is expected that the cost of the programme under the Regular Budget will increase by $6000, as a net result of price increases of $94 000 and a programme decrease of $88 000.

J/2. The total costs of this programme are presented in Annex V. Details of extrabudgetary resources will be found in Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983).

Manpower

J/3. As will be seen from Table J.2 above, the upgrading of one professional post from the P-4 to the P-5 level is foreseen for 1983. The justification is provided in Annex IV.

J/4. For 1984, the addition of one GS post is foreseen. In 1985, one further GS post will be required.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 000 000	80 000	(80 000)	-	1 000 000	1 000 000	1 000 000
179 000	14 000	(8 000)	6 000	185 000	190 000	195 000
1 179 000	94 000	(88 000)	6 000	1 185 000	1 190 000	1 195 000

THE PROGRAMME

OBJECTIVE

J/5. The objective is to foster, through research and training for research, the advancement of physics and - to a lesser extent - work in applicable mathematics, with special regard to the needs of developing countries so as to encourage scientists from those countries to continue and expand their research work.

CO-OPERATION WITH OTHER ORGANIZATIONS

J/6. The Centre is operated jointly by the Agency and by UNESCO, and is supported by the Italian Government; the Governments of Denmark, the Federal Republic of Germany, Japan, Sweden (through SAREC) and the United States of America and the Kuwait Foundation for the Advancement of Science have participated in its financing; the OPEC Fund, the United Nations Interim Fund for Science and Technology for Development, the United Nations University, the University of Sebha (Lybia) and UNEP have financed the Associate Scheme, programmes on solid-state physics to be held in Africa and on monsoon dynamics to be held in Bangladesh, and a workshop on desertification.

J/7. Discussions regarding further financing are in progress with the above-mentioned Governments and institutions and with the Canadian International Development Agency.

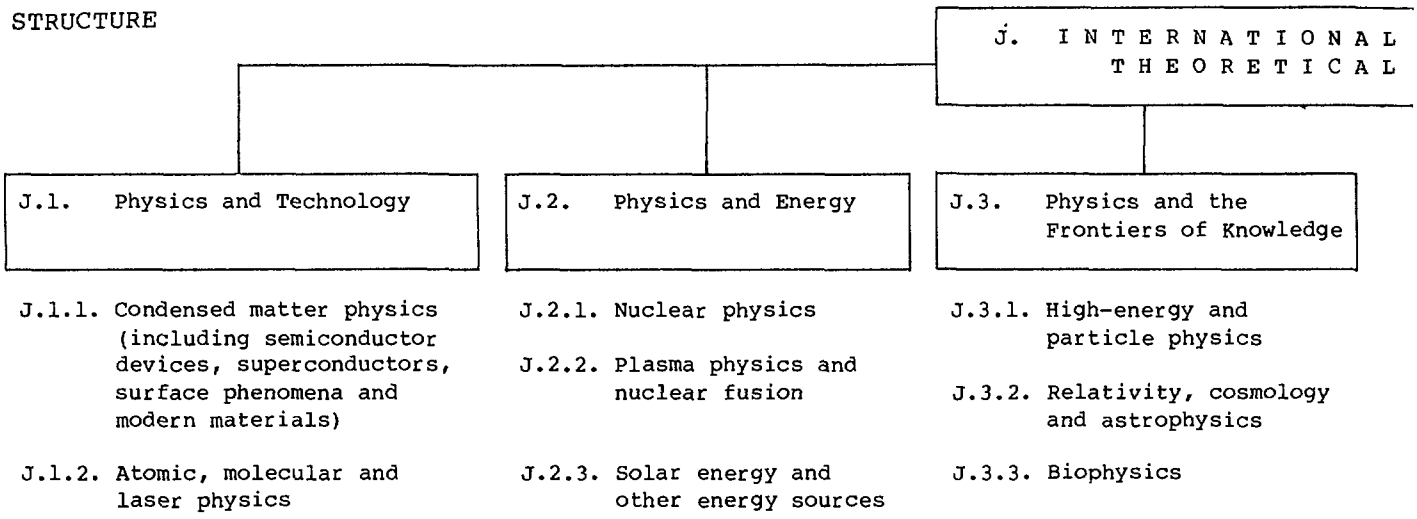
J/8. It is expected that other United Nations specialized agencies will co-operate in areas within their spheres of interest.

RELATED ACTIVITIES

J/9. As a follow-up to activities at the Centre, and in order to give more researchers from developing countries an opportunity to discuss problems in their own environment, support has been given to a number of meetings in developing countries, the main ones being the conferences on physics and contemporary needs held in Pakistan every year since 1976; these conferences were supported largely by the Government of Pakistan (the one held in 1976 also received considerable support from SIDA) and were attended by over 100 scientists each year. In 1981, the Centre supported the following activities: the Fifteenth Curcaf Meeting in Honduras; the First East African Symposium on Pure and Applied Mathematics; Multiciencias 1981 (Peru); the Workshop on Problems of Physics in the Less Developed Regions in Europe (Turkey); a Symposium on the International Dimensions of the Energy Problem (Spain); a Group Representation Summer School (Nigeria), the Twentieth

Schladming School; an All-India Seminar on Finite Element Methods in Biology; a Seminar on Estuaries (India); a Workshop on Living State (India); and the Regional College on Solid State Physics (Ghana). The Centre has also sponsored a workshop on physics teaching in Louvain-la-Neuve (Belgium) for the benefit of French-speaking African scientists, the cost of which was borne by the French Ministries of Foreign Affairs and Co-operation.

STRUCTURE



PROGRAMME TRENDS FOR 1983-88

J/10. The plans described below cover in general only the period 1983-84. During 1985-88, there will be somewhat more emphasis on those areas of physics which are of greatest relevance to energy problems.

J/11. This programme, formulated in the light of advice given by the Centre's Scientific Council and by various advisory committees, has the structure shown in the chart.

SUB-PROGRAMME J.1

Physics and technology

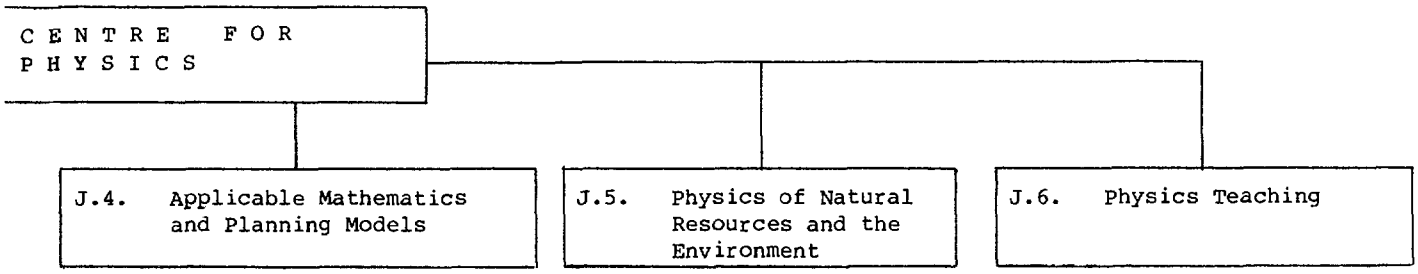
OBJECTIVE

J.1/1. The objective is to foster fundamental research and training for research in condensed matter physics and in atomic, molecular and laser physics in developing countries, with emphasis on aspects leading to applications in industrial and technological development.

Condensed matter physics (including semiconductor devices, superconductors, surface phenomena and modern materials) (component J.1.1)

Results to date

J.1.1/1. Extended courses were held in 1976, 1978 and 1980 and workshops lasting three to four months have been organized every year since 1975; topical meetings have been held in various years within the framework of the workshops. A spring college on amorphous solids and the liquid state (to be followed by a workshop) has been planned for 1982. To date, about 1800 scientists have participated in these activities. Approximately 315 preprints and the proceedings of the extended courses have been published.



J.4.1. Applicable mathematics

J.4.2. Systems analysis, computing and the mathematics of development

Plans for 1983-84

J.1.1/2. It is planned to organize a workshop on condensed matter physics in 1983 and a spring college on condensed matter physics and material science followed by a workshop on condensed matter physics in 1984.

Atomic, molecular and laser physics (component J.1.2)

Results to date

J.1.2/1. The Centre has organized three winter colleges on atoms, molecules and lasers (in 1973 and 1977) and two on atomic, molecular and laser physics and quantum optics (1979 and 1981). They were attended by a total of 404 lecturers and other participants.

Plans for 1983-84

J.1.2/2. Topics in atomic, molecular and laser physics will be discussed at a winter college in 1983.

SUB-PROGRAMME J.2

Physics and energy

OBJECTIVE

J.2/1. The objective is to foster research and training for research in theoretical nuclear physics and nuclear reactor theory and in the physics of nuclear fusion and of renewable energy sources such as solar energy, with particular reference to the needs of developing countries.

Nuclear physics (component J.2.1)

Results to date

J.2.1/1. An extended course was organized in 1979. Workshops and topical meetings were organized in 1975, 1976, 1978 and 1980. In the years when there was no formal programme of work in nuclear physics, some research was carried out by associate members, independently or in collaboration with scientific staff of the University of Trieste. Some 1800 scientists have participated in these activities. A course and workshops on nuclear theory and nuclear reactors have been planned for 1982. Proceedings of the extended courses and of various topical meetings have been published.

Plans for 1983-84

J.2.1/2. A workshop (including a topical meeting) on nuclear and reactor physics is planned for 1983 and a further extended seminar will be held in 1984.

Plasma physics and nuclear fusion (component J.2.2)

Results to date

J.2.2/1. A research session was organized in 1978 and a topical meeting in 1975. In 1977, the Centre organized a three-week seminar on theoretical and computational plasma physics, during which the Third International (Kiev) Conference on Plasma Theory was held, and hosted a meeting of the IFRC. An autumn course on plasma physics took place in 1979 and another in 1981.

J.2.2/2. Excellent collaboration between participating plasma physicists has characterized the research sessions. In recent years there has been a marked increase in the participation of scientists from developing countries.

Plans for 1983-84

J.2.2/3. An extended course or workshop on plasma physics will be organized in 1983.

Solar energy and other energy sources (component J.2.3)

Results to date

J.2.3/1. In 1977, 1979 and 1981 the Centre organized, in collaboration with the International College of Applied Physics, courses on solar energy and non-conventional energy; they were attended by a total of 547 lecturers and other participants. In 1978 and in 1980 a meeting (followed by an extended seminar) on thermal storage was held in French, mainly for the benefit of French-speaking African scientists; 249 participants attended.

Plans for 1983-84

J.2.3/2. It is planned to organize a summer college on non-conventional energy sources in 1983 and 1984. Also, the Centre will support outside activities.

SUB-PROGRAMME J.3

Physics and the frontiers of knowledge

OBJECTIVE

J.3/1. The objective is to provide a forum for international collaboration at the highest possible level in the most advanced research in fundamental theoretical physics and to enable university teachers from

developing countries, through participation in meetings held at the Centre, to bring their knowledge up to date and to exchange ideas concerning their research work.

High-energy and particle physics (component J.3.1)

Results to date

J.3.1/1. One topical meeting was held in 1975, four in 1976, two in 1977 and one in 1978. In 1979 there was a summer workshop on theoretical physics; in 1980 a topical meeting on confinement in field theory and in 1981 there was a summer workshop held as a follow-up of the 1979 workshop and a meeting on monopoles in quantum field theories. Research in high-energy physics has been carried out continuously at the Centre since its establishment. About 4000 physicists have participated in this part of the programme as visiting or guest scientists, associate members, fellows, guest lecturers and seminar participants. Over a thousand preprints and the proceedings of the seminar held in 1965 and of various other meetings have been published.

Plans for 1983-84

J.3.1/2. Topical meetings on high-energy physics will be held in both years. Research will continue and one or more meetings relating to current developments will be held if the need arises.

Relativity, cosmology and astrophysics (component J.3.2)

Results to date

J.3.2/1. A conference on high-resolution spectronomy was held in 1978 and an international workshop on image processing in astronomy, organized by the University of Trieste, was held on the Centre's premises in 1979. A meeting on recent developments in the fundamentals of general relativity took place in 1975 and one on physics and astrophysics aspects of the Spacelab programme in 1976; total participation in the two meetings was 208. A second Marcel Grossmann meeting was organized in 1979, with the participation of 370 scientists. The Centre has arranged to sponsor the Third Marcel Grossmann meeting in the People's Republic of China in 1982.

Plans for 1983-84

J.3.2/2. It is planned to organize summer research sessions and/or topical meetings, possibly in both years. The size of the research group will depend on the resources available.

Biophysics (component J.3.3)

Results to date

J.3.3/1. A conference on applications of physics to medicine and biology and a summer college in biophysics have been arranged for 1982.

Plans for 1983-84

J.3.3/2. Subject to the availability of funds, small meetings will be held during this period.

SUB-PROGRAMME J.4

Applicable mathematics and planning models

OBJECTIVE

J.4/1. The objective is to acquaint scientists with applications of and new methods for using mathematical tools in the various disciplines in which activities are conducted at the Centre through, for example, projects financed by UNDP and executed by UNESCO.

Applicable mathematics (component J.4/1)

Results to date

J.4.1/1. An extended seminar on fluid dynamics and its applications to other branches of science was held in 1976 and an extended course on applications of complex analysis in 1975; a workshop on problems of boundary values for ordinary differential equations and of their applications took place in 1977. A study group on solitons, partial differential equations and spectral methods met in July 1979, bringing together some 40 scientists. A workshop on recent advances in the theory of evolution equations was held in November 1979. A workshop on non-linear boundary value problems was organized in 1980, as was a summer seminar on complex analysis. An autumn course on variational methods in analysis and mathematical physics was held in 1981.

Plans for 1983-84

J.4.1/2. The subject of applicable mathematics will be covered at meetings which also deal with systems analysis (see J.4.2/2 below).

Systems analysis, computing and the mathematics of development (component J.4.2)

Results to date

J.4.2/1. A course on systems analysis and one on mathematical economics took place in 1978, with a total participation of 196 scientists.

Plans for 1983-84

J.4.2/2. A college on dynamical systems mathematics and systems analysis will be held in 1983 and a further extended seminar is being planned for 1984. A course in French on mathematical economics is being planned for 1983.

SUB-PROGRAMME J.5

Physics of natural resources and the environment

OBJECTIVE

J.5/1. The objective is to foster, in developing countries, research and training for research (both fundamental and applied) in fields relating to natural resources, with emphasis on their preservation and on pollution problems, and to bring the specialized knowledge and skills of physicists, mathematicians and biologists to bear on particular problems.

RESULTS TO DATE

J.5/2. The Centre organized a three-month course on the physics of the oceans and the atmosphere in 1975; it was attended by 123 scientists. A ten-week course on the physics of the earth, including an advisory meeting and seminar on earthquake prediction, was held in 1977, with the participation of some 110 scientists. In 1980, an autumn course on the physics of flow in oceans, the atmosphere and deserts was held with the participation of 140 scientists.

PLANS FOR 1983-84

J.5/3. A course on soil physics and on the physics of energy in agriculture and related topics will be organized in 1983, possibly with the co-operation of other international organizations.

SUB-PROGRAMME J.6

Physics teaching

OBJECTIVE

J.6/1. The objective is - under UNESCO's auspices - to impart to scientists with teaching duties in developing countries modern teaching methods which take local social, economic and cultural conditions into account, thereby promoting and improving the teaching of physics at all levels, particularly in Member States where scientific communities are still very small.

RESULTS TO DATE

J.6/2. A workshop was organized in 1976 for scientists from English-speaking developing countries and one in 1977 for scientists from French-speaking developing countries; the numbers of participants were 50 and 83, respectively. In 1979, the Centre supported a course in Grenoble, France, similar to the 1977 workshop and in 1981 a course in French on physics teaching was held in Louvain-la-Neuve, Belgium.

PLANS FOR 1983-84

J.6/3. It is planned to hold workshops and seminars in both years, subject to the availability of funds.

K. INTERNATIONAL LABORATORY OF MARINE RADIOACTIVITY

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table K.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	620 543
Consultants	10 255
Temporary assistance	912
Sub-total	631 710
Common staff costs	221 695
Travel	10 629
Representation and hospitality	553
Scientific and technical contracts	1 683
Scientific supplies and equipment	79 883
Common services, supplies and equipment	41 054
Other items of expenditure	-
Transfer of costs:	
Translation and records services	655
Printing and publishing services	1 464
TOTAL	989 326

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
783 000	(29 000)	-	(29 000)	754 000	793 000	857 000
15 000	800	(6 800)	(6 000)	9 000	11 000	13 000
500	-	3 000	3 000	3 500	4 000	4 500
798 500	(28 200)	(3 800)	(32 000)	766 500	808 000	874 500
242 700	(1 100)	-	(1 100)	241 600	253 500	274 600
15 000	1 700	1 300	3 000	18 000	20 500	23 000
1 800	100	-	100	1 900	2 000	1 900
35 000	2 500	2 500	5 000	40 000	45 000	24 000
64 000	8 000	(2 000)	6 000	70 000	81 000	96 000
48 000	5 000	(2 000)	3 000	51 000	56 000	64 000
-	-	-	-	-	40 000	42 000
1 000	-	-	-	1 000	1 000	2 000
2 000	-	-	-	2 000	1 000	4 000
1 208 000	(12 000)	(4 000)	(16 000)	1 192 000	1 308 000	1 406 000

SUMMARY OF MANPOWER

Table K.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
P-5	2	2	2	-	2	2	2
P-4	3	3	3	-	3	3	3
P-3	1	1	1	-	1	1	1
P-2	-	2	3	-	3	3	3
P-1	3	1	1	-	1	1	1
Sub-total	9	9	10	-	10	10	10
GS	14	14	13	-	13	13	13
TOTAL	23	23	23	-	23	23	23

CHANGES IN COSTS AND MANPOWER

Costs

K/1. As will be seen from Table K.1 above, the cost of this programme under the Regular Budget is expected to decrease by $16 000. As a result of the change in the exchange rate between the United States dollar and the French franc, the cost of salaries and common staff costs will decrease. Increases arise mainly in connection with those items for which prices are in United States dollars and those where price rises exceed the exchange rate difference. In total, there will be a price reduction of $12 000 and a programme decrease of $4000.

K/2. Programme decreases are foreseen in respect of consultants' services ($6800), scientific supplies and equipment ($2000) and common services, supplies and equipment ($2000). Programme increases are foreseen in respect of temporary assistance ($3000), travel ($1300) and scientific and technical contracts ($2500).

Summary of manpower and costs by sub-programme

Table K.3

Sub-programme	1983 Estimate				
	Man-years		Costs		
	P	GS	Staff	Other	Total
Evaluation of environmental impacts of radionuclide releases	6.0	5.0	546 000	71 000	617 000
Deep-ocean radioactive waste disposal assessment	2.5	6.0	310 000	89 000	399 000
Contributions to international marine pollution monitoring	1.5	2.0	152 000	24 000	176 000
TOTAL	10.0	13.0	1 008 000	184 000	1 192 000

K/3. As can be seen from Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), the contribution from the Monegasque Government is expected to be $135 000. An amount of $100 000 is expected from UNEP.

Manpower

K/4. As will be seen from Table K.2 above, one GS post from this programme is exchanged for a P-2 post from the "Physical Sciences" programme in the 1982 adjusted manning table. The justification is provided in Annex IV.

K/5. No further changes are foreseen for 1984 and 1985.

THE PROGRAMME

OBJECTIVE

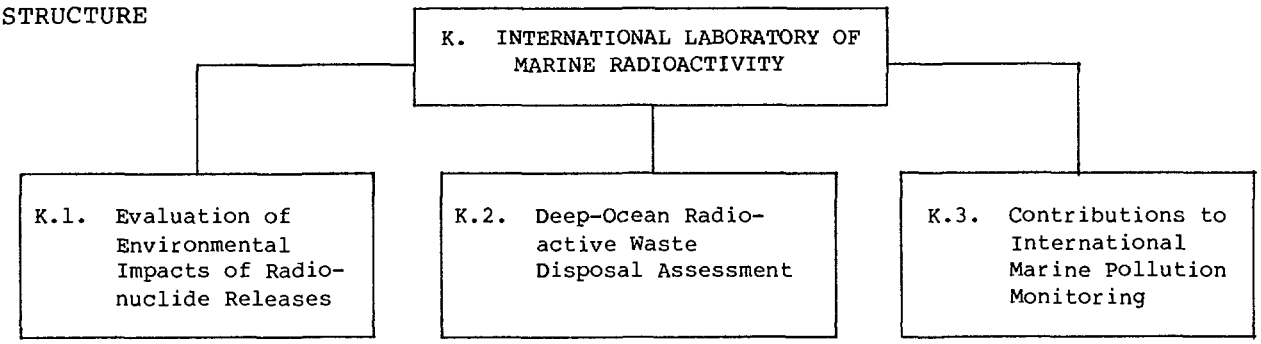
K/6. The objectives are:

(a) to study the occurrence and behaviour of radioactive substances and other forms of pollution in the marine environment;

(b) to ensure the quality and comparability of studies of radioactive substances and other forms of pollution in the marine environment carried out by national laboratories through inter-laboratory comparisons, calibration and standardization of methodology; and

(c) to assist Member States by training personnel, establishing co-ordinated research programmes and providing advice and assistance.

STRUCTURE



1984 Preliminary estimate					1985 Preliminary estimate				
Man-years		Costs			Man-years		Costs		
P	GS	Staff	Other	Total	P	GS	Staff	Other	Total
6.0	5.0	572 000	96 000	668 000	6.0	5.0	620 000	111 000	731 000
2.5	6.0	329 000	114 000	443 000	2.5	6.0	356 000	106 000	462 000
1.5	2.0	161 000	36 000	197 000	1.5	2.0	173 000	40 000	213 000
10.0	13.0	1 062 000	246 000	1 308 000	10.0	13.0	1 149 000	257 000	1 406 000

SUB-PROGRAMME K.1

Evaluation of environmental impacts of radionuclide releases

OBJECTIVE

K.1/1. The objective is to gather and systematize information on the behaviour and effects of radionuclides released into the marine environment as the basis for assisting Member States, particularly those that are developing countries, in assessing the environmental impact of radionuclide releases.

RESULTS TO DATE

K.1/2. Studies of interactions between marine plankton and certain transuranic elements have commenced, with emphasis on food chain transfer and geochemical processes. The results obtained so far indicate substantial accumulation and retention of these elements by phytoplankton, with zooplankton accumulating them to a lesser degree. Biogenic particulate matter produced by plankton indicates increasing plutonium concentrations with depth, thus emphasizing the important role of faecal pellets in the transport of radionuclides to great depths in the oceans.

K.1/3. Biokinetic studies using the gamma-emitting tracer technetium-95^m have shown that the behaviour of technetium (an important element in radioactive waste) varies widely among the different groups of marine organisms. Although its uptake generally appears to be low compared with that of transuranic elements, once accumulated - from either food or water - it persists for long periods in the tissues of many species.

K.1/4. Continuing measurements of transuranic and other radionuclides in sea water, suspended matter and other material collected from the Mediterranean and elsewhere show that their behaviour in the Mediterranean is different from that in other seas. Although the differences observed seem to be related to their oxidation states, the processes involved in their fractionation in the water column are not yet understood.

K.1/5. The alpha-emitter polonium-210 has been shown to be the major contributor to the natural radiation dose received by most marine organisms. It is concentrated in the hepatopancreas of marine crustacea and cephalopoda, and there are indications that a particularly high natural radiation regime exists in certain mid-water organisms, notably penaeid shrimps. The transfer of polonium-210 in the marine environment is heavily mediated by biological processes.

K.1/6. Several intercalibration exercises for measurements of radionuclides, especially transuranics, were carried out by the Laboratory in recent years; about 30 national laboratories in 15 Member States participated. One sea water sample, two biological samples and two sediment samples were distributed after the intercalibration exercises to national laboratories, on request, for the purpose of analytical quality control. Americium measurements continue to pose a serious problem for a majority of the participating laboratories.

PLANS FOR 1983-84

K.1/7. Work will continue on the quantification of vertical flux processes in different oceanic regions. Radiotracer studies designed to measure transfer coefficients of transuranic elements and other important long-lived radionuclides from water, food and sediments in marine species will be carried out with the ultimate aim of determining the various routes of transfer of radionuclides to man.

K.1/8. Examination of polonium-210 in the oceans will aim at establishing (i) the behaviour of this nuclide in the neuston layer, (ii) its subcellular distribution in the hepatopancreas and (iii) its level of concentration in

mid-water and deep-sea species, in order that realistic comparisons can be made between doses due to natural radiation and doses that could arise from man's use of the deep seabed for radioactive waste disposal.

K.1/9. The measurements of transuranic and other long-lived radionuclides will continue, with emphasis on the samples collected from interface (water/sediment, fresh-water/sea-water, etc.) boundaries, where chemical processes take place intensively. The development of analytical methods for determining technetium-99 and natural actinides will continue, account being taken of their possible formulation as reference procedures.

K.1/10. Intercalibration exercises will be organized along the lines recommended at a consultants' meeting on the Agency's analytical quality control programme. The emphasis will be placed on low-level measurements of transuranics and other actinides. Reference samples of sea water and marine sediment will be distributed and the intercalibration exercises will be undertaken within the framework of the Agency's study of radioactive materials in the Baltic Sea.

RELATED ACTIVITIES

K.1/11. Staff of the Laboratory contributed to a CRP on transuranic cycling behaviour in the marine environment conducted under the "Nuclear Fuel Cycle" programme. Also, they helped to prepare and participated in an IAEA/NEA symposium on "Impacts of Radionuclide Releases into the Marine Environment", held in October 1980.

K.1/12. Experts were provided for the work of GESAMP (Group of Experts on the Scientific Aspects of Marine Pollution), including its working groups on "The Health of the Oceans" and "Oceanographic Modelling".

K.1/13. Technical personnel from Egypt, Greece, the Philippines, Portugal and Turkey received training in performing radionuclide measurements on marine environmental samples. Laboratories in Greece and Portugal were advised on the implementation of radionuclide measurement programmes. Experts from Denmark and Japan participated in the work of the Laboratory. Limited training was provided for students from France, Poland and the United Kingdom.

K.1/14. The training of technical personnel from developing countries will continue, to the extent possible with existing facilities, at a rate of 2-4 persons a year. Advice on national environmental radionuclide measurement programmes will be given to developing countries initiating such programmes.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

K.1/15. Studies will be extended to cover deeper areas of the marine environment. The importance of interactions between radionuclides and organic substances occurring in the marine environment will be examined in order to evaluate the role of such processes for radionuclide cycling in radionuclide release areas.

K.1/16. It is expected that technical co-operation activities will expand as more developing countries initiate nuclear programmes.

K.1/17. There will probably be a change in the location and an improvement of the Laboratory premises during the period 1984-88.

CO-OPERATION WITH OTHER ORGANIZATIONS

K.1/18. Co-operation is foreseen with NEA, OECD and the International Committee for Radionuclide Metrology in specific intercalibration programmes, with UNESCO (Division of Marine Sciences and the Intergovernmental Oceanographic Commission) in training and with UNEP in formulating reference methods for radionuclide measurements.

K.1/19. It is expected that Laboratory staff members will continue to be associated, in consulting roles, with the Subseabed Disposal Programme (conducted by Sandia National Laboratories on behalf of the United States Department of Energy). Continued participation in the VERTEX programme (an international study of vertical transport processes) is anticipated.

K.1/20. Technical co-operation is foreseen with institutions in the Member States in the Baltic region (Denmark, the German Democratic Republic, the Federal Republic of Germany, Finland, Norway, Poland, the Soviet Union and Sweden).

SUB-PROGRAMME K.2

Deep-ocean radioactive waste disposal assessment

OBJECTIVE

K.2/1. The objective is to investigate the behaviour of long-lived radionuclides associated with the present and future deep-ocean disposal of low-, medium- and high-level radioactive wastes and to provide technical assistance within the framework of the Agency's waste management activities.

RESULTS TO DATE

K.2/2. Experimental studies on the adsorption rates, equilibrium partition coefficients and geochemical partitioning of transuranic radionuclides in marine sediments have shown that the rates of adsorption by Atlantic dump site sediments are high, with distribution coefficients differing by several orders of magnitude.

K.2/3. Uptake rates, tissue distributions and loss rates for transuranic and other radionuclides in the case of benthic fauna in experimentally contaminated sediments are being studied. Initial work with technetium and sediments from near the North East Atlantic Dump Site indicates only slight uptake by certain species.

K.2/4. Laboratory staff have been assisting with a revision of Safety Series No. 5 ("Radioactive Waste Disposal into the Sea") and of the Agency's oceanographic model for use in marine radioactive waste disposal studies. The Agency has been represented by Laboratory staff on the NEA/OECD Executive Group for Marine Radioactive Waste Disposal, where it is responsible for chairing the group on geochemical aspects related to the assessment of the North East Atlantic Dump Site.

PLANS FOR 1983-84

K.2/5. Studies on the behaviour in deep-ocean sediments of long-lived radionuclides from existing and potential dump sites in the Atlantic and Pacific oceans will continue. Emphasis will be placed on identifying and obtaining data required for use in oceanographic models of radioactive waste behaviour in the deep sea.

K.2/6. Continued participation and contributions are planned in connection with the Agency's involvement in international waste management activities, such as IMCO meetings relating to the London Dumping Convention and GESAMP working group meetings.

K.2/7. The CRP concerned with deep-ocean radioactive waste disposal will continue (Table K.4, No.1).

RELATED ACTIVITIES

K.2/8. There will be co-operation with Member States in the development and formulation of waste management projects. Training in the use of

experimental geochemical and biological techniques for the study of radionuclide uptake by biota from sediments and sea water will be offered.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

K.2/9. After completion of the CRP, the data from it and from other research activities will be assessed for use in modelling radioactive waste behaviour in the deep ocean.

CO-OPERATION WITH OTHER ORGANIZATIONS

K.2/10. Close co-operation is maintained with IMCO, NEA, the International Subseabed Disposal Programme and GESAMP. High-pressure studies (for simulation of the deep-ocean regime) are being prepared in collaboration with the CEC's radioactive waste studies group at Ispra, Italy.

SUB-PROGRAMME K.3

Contributions to international marine pollution monitoring

OBJECTIVE

K.3/1. The objective is to assist Member States in the monitoring of marine pollution by organizing and managing intercalibrations of non-nuclear pollutant measurements, by providing instrument maintenance services for developing countries and training technical personnel, and by participating in programmes for the regional and global monitoring of non-nuclear pollution in the marine environment in support of the work of other international organizations and within the framework of the funds provided by them.

RESULTS TO DATE

K.3/2. The Laboratory participated in the pilot phase of the Joint Programme on Pollution Monitoring and Research of the Mediterranean Sea (MED POL-Phase I), co-ordinated by UNEP; it organized intercalibrations of trace metal and chlorinated hydrocarbon measurements, provided instrument maintenance services to Mediterranean coastal States, and participated in the open-sea monitoring of Mediterranean pollution and in studies on the biogeochemical behaviour of selected pollutants. More than 100 laboratories in over 30 Member States participated in the intercalibration exercises and Laboratory staff made about 50 emergency and regular visits to national laboratories in order to service atomic absorption spectrophotometers and gas chromatographs. Samples of sea water, marine organisms, sediments and other material collected from the open Mediterranean were analysed for trace metals and chlorinated hydrocarbons; the results demonstrated that the levels of these pollutants were not significantly different from those in other seas.

K.3/3. On the basis of the experience gained through participation in MED POL-Phase I, the Laboratory helped in formulating a programme for MED POL-Phase II, covering the period 1981-90.

K.3/4. Laboratory staff assisted in the preparatory phases of the Kuwait Action Plan (KAP) by participating in a three-month interdisciplinary mission to the Gulf; the result was a regional directory for marine science-related research centres which is being used in assessing the ability of such centres to contribute to the KAP monitoring programme to establish baseline pollution levels. Also, Laboratory staff participated in expert meetings convened to draw up detailed work plans for various KAP projects. In addition, the Laboratory carried out an oil pollution survey in the Sultanate of Oman and the Strait of Hormuz.

K.3/5. Assistance was given in the planning of a project for monitoring marine pollutants off Central and West Africa.

K.3/6. The Laboratory participated in intercalibration exercises relating to the determination of chlorinated hydrocarbons in open-ocean samples as part of a UNESCO (Intergovernmental Oceanographic Commission)/WMO/UNEP project, preparing and distributing samples for the intercalibration of analytical methods for determining chlorinated hydrocarbons in sea water.

PLANS FOR 1983-84

K.3/7. Within the framework of MED POL-Phase II, the Laboratory will organize intercalibration measurements, provide instrument maintenance services, develop reference methods for pollutant measurements and co-ordinate research on the behaviour of selected pollutants in the marine environment.

K.3/8. In the next phase of KAP, the Laboratory will - inter alia - provide intercalibration and instrument maintenance services, help to train local scientific and technical personnel and advise scientists involved in KAP projects. Co-operation with various Gulf States in carrying out pollution surveys is envisaged.

RELATED ACTIVITIES

K.3/9. Training in the determination of chlorinated hydrocarbons in marine samples was given in Lebanon. Contact with laboratories in Egypt and Greece aimed at improving their analytical precision was maintained.

K.3/10. The training of technical personnel in pollutant measurement and related work at the Laboratory and in Member States' laboratories will probably increase as a result of support from UNESCO and UNEP and of funds-in-trust arrangements with various Member States.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

K.3/11. The further development of reference analytical methods to take into account additional pollution parameters is necessary, and intercalibration exercises will be extended to include these parameters. Training in new techniques for pollution monitoring will be introduced.

CO-OPERATION WITH OTHER ORGANIZATIONS

K.3/12. Financing for many of the activities conducted under this sub-programme is received from UNESCO, UNEP and (through funds-in-trust arrangements) the countries participating in the Mediterranean Action Plan and KAP. Collaboration with UNESCO (Intergovernmental Oceanographic Commission), UNEP, FAO and WMO will continue.

Co-ordinated research programmes

Table K.4

Co-ordinated programme title	Number of Contracts	Number of Agreements	Year initiated	Probable year of completion
1. Marine behaviour of long-lived radionuclides associated with the deep-ocean disposal of radioactive wastes	This programme has been approved but no contract has yet been awarded			

L. SAFEGUARDS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table L.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	9 987 242
Consultants	28 512
Overtime	1 954
Temporary assistance	2 134
Sub-total	10 019 842
Common staff costs	3 566 547
Travel	1 633 136
Meetings	
Conferences, symposia, seminars	38 728
Technical committees advisory groups	141 575
Representation and hospitality	11 881
Scientific and technical contracts	153 693
Scientific supplies and equipment	907 687
Common services, supplies and equipment	428 816
Other items of expenditure	949
Transfer of costs:	
Translation and records services	100 215
Printing and publishing services	134 739
Data processing services	1 805 090
Laboratory services	746 014
Legal services	150 000
Conference and contracts services	22 823
TOTAL	19 861 735

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
12 260 000	1 356 000	23 000	1 379 000	13 639 000	16 512 000	18 713 000
257 500	19 800	105 400	125 200	382 700	336 000	325 300
6 600	500	(100)	400	7 000	7 600	8 200
43 200	3 600	4 600	8 200	51 400	56 000	61 100
12 567 300	1 379 900	132 900	1 512 800	14 080 100	16 911 600	19 107 600
3 801 100	556 100	5 000	561 100	4 362 200	5 283 800	5 988 800
2 605 400	278 500	(174 900)	103 600	2 709 000	3 335 300	3 747 600
66 000	3 000	(38 000)	(35 000)	31 000	36 000	41 000
137 000	7 300	88 700	96 000	233 000	253 000	286 000
20 000	1 000	(300)	700	20 700	22 500	24 300
770 000	52 000	(17 000)	35 000	805 000	933 000	1 008 000
1 580 000	205 000	2 312 000	2 517 000	4 097 000	5 432 000	6 470 000
411 200	38 200	109 600	147 800	559 000	635 800	695 700
-	-	10 000	10 000	10 000	-	-
233 000	15 000	(56 000)	(41 000)	192 000	206 000	221 000
199 000	13 000	49 000	62 000	261 000	207 000	221 000
2 028 000	185 000	8 000	193 000	2 221 000	2 277 000	2 292 000
1 068 000	90 000	9 000	99 000	1 167 000	1 272 000	1 365 000
165 000	6 000	-	6 000	171 000	184 000	198 000
49 000	2 000	(27 000)	(25 000)	24 000	25 000	27 000
25 700 000	2 832 000	2 411 000	5 243 000	30 943 000	37 014 000	41 693 000

SUMMARY OF MANPOWER

Table L.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
DDG	1	1	1	-	1	1	1
D	4	4	4	3	7	7	7
P-5	52	52	52	(2)	50	52	53
P-4	103	108	108	3	111	115	115
P-3	62	63	63	1	64	65	66
P-2	-	-	-	1	1	1	1
P-1	-	-	-	9	9	9	9
Sub-total	222	228	228	15	243	250	252
GS	133	140	140	17	157	183	212
TOTAL	355	368	368	32	400	433	464

CHANGES IN COSTS AND MANPOWER

Costs

L/1. As will be seen from Table L.1 above, it is expected that the cost of this programme will increase by $5 243 000, of which $2 832 000 will be required to cover salary and other price increases and $2 411 000 will be a programme increase.

L/2. The programme increase of $28 000 in respect of salaries for established posts and common staff costs is the net result of the addition of 5 Professional and 27 GS posts in the manning table for 1983 partly offset by the lapse of existing manning table posts.

L/3. Programme increases are foreseen in respect of consultants' services ($105 400) - mainly in "Safeguards development and technical support" and in "Safeguards evaluation" - and of temporary assistance ($4600). The programme decrease of $174 900 is related mainly to inspection travel, while the programme decrease of $17 000 in respect of scientific and technical contracts is mainly related to the "Safeguards development and technical support" sub-programme. The programme decrease of $38 000 in respect of conferences, symposia and seminars is attributable to the reduction in the number of meetings from two in 1982 to one in 1983.

L/4. Of the programme increase of $88 700 in respect of Technical Committees and Advisory Groups, about one half is attributable to the International Plutonium Storage study, for which two Technical Committee meetings are planned.

L/5. A programme increase of $2 312 000 is foreseen in respect of scientific supplies and equipment. The equipment comprises non-destructive analysis and containment/surveillance equipment - for both operational use and for safeguards development - and equipment for the Safeguards Analytical Laboratory. The programme increase of $109 600 in respect of common services, supplies and equipment is required mainly in the "Safeguards development and technical support" and the "Safeguards operations" sub-programmes. A programme increase of $10 000 is foreseen under "Others items of expenditure" for training activities.

L/6. As regards the allocation of service costs, programme increases in respect of printing and publishing services ($49 000), data processing services ($8000) and laboratory services ($9000) are offset by programme decreases in respect of linguistic services ($56 000) and conference and contracts services ($27 000).

L/7. As can be seen from Table 1 (THE CONSOLIDATED BUDGET - 1983) and Table 5 (EXTRABUDGETARY RESOURCES 1981-1983), it is expected that the "Safeguards" programme will be supported by contributions amounting to $2 680 000, consisting of $80 000 from Australia, $200 000 from Canada, $200 000 from the Federal Republic of Germany, $300 000 from Japan, $300 000 from the Soviet Union, $100 000 from the United Kingdom and $1.5 million from the United States.

L/8. It is expected that income in the form of amounts recoverable under safeguards agreements from non-member States will total $200 000 in 1983.

Manpower

L/9. As will be seen from Table L.2 above, the net effect of changes in the manpower of the Department of Safeguards will be an increase of 15 in the number of Professional posts and 17 GS posts. This is made up as follows. The addition of 5 Professional and 27 GS posts is foreseen for 1983. In connection with the reorganization of the Department of Safeguards, the upgrading of three P-5 posts to the Director level is foreseen. Further, the upgrading of ten GS posts to the Professional level (nine P-1 and one P-2) is foreseen as a result of a classification survey for data processing specialists. Justification is given in Annex IV.

L/10. For 1984, the addition of 7 Professional and 26 GS posts is foreseen. In 1985, the further addition of 2 Professional and 29 GS posts will be required.

THE PROGRAMME

OBJECTIVE

L/11. The objective is to apply safeguards under agreements to which the Agency is a party. To achieve this objective in the most efficient and effective way, safeguards concepts and criteria are developed and adopted, procedures are established and implemented, and new safeguards techniques and equipment are developed and tested.

PLANS FOR 1983-84

L/12. It is expected that, during the period 1983-84, the Standing Advisory Group on Safeguards Implementation (SAGSI) will continue to advise on technical aspects of safeguards implementation (Table L.16, No.1).

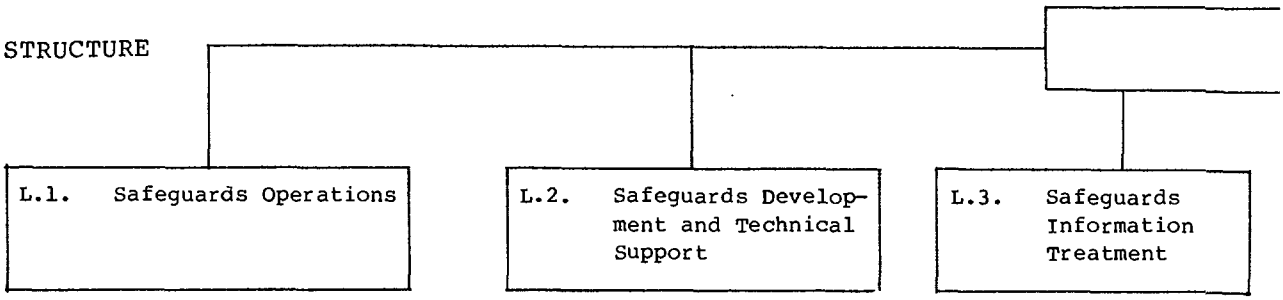
RELATED ACTIVITIES

L/13. Technical support for the Agency's safeguards programme is provided by the Legal Division, the Division of External Relations, the Laboratory, the Computer Section and the Division of Nuclear Safety.

CO-OPERATION WITH OTHER ORGANIZATIONS

L/14. The programme involves extensive co-operation with national and regional nuclear energy authorities.

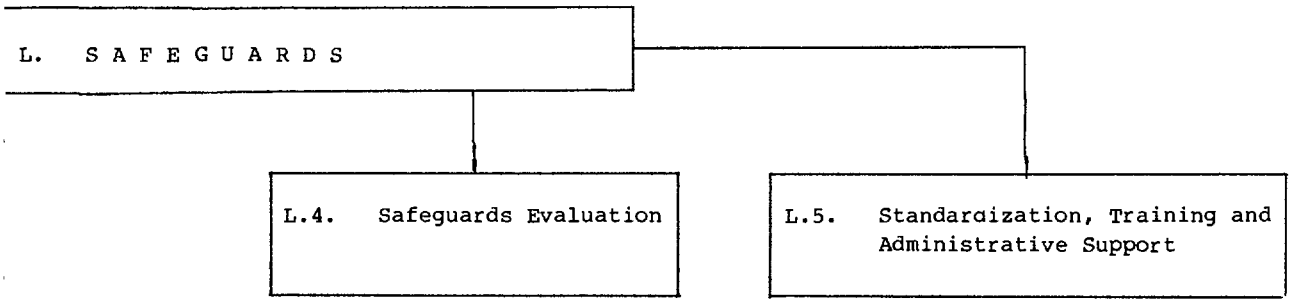
STRUCTURE



Summary of manpower by organization unit and category

Table L.3

Organization unit	1981 Adjusted budget		
	P	GS	Total
Programme co-ordination	4	7	11
Safeguards operations A	67	22	89
Safeguards operations B	82	25	107
Safeguards operations C	-	-	-
Safeguards development and technical support	30	20	50
Safeguards information treatment	23	46	69
Safeguards evaluation	9	8	17
Safeguards standardization, training and administrative support	7	5	12
TOTAL	222	133	355



1982 Adjusted budget			1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
P	GS	Total	P	GS	Total	P	GS	Total	P	GS	Total
1	2	3	1	2	3	1	2	3	1	2	3
56	16	72	56	28	84	56	34	90	56	37	93
35	13	48	35	17	52	35	22	57	35	28	63
62	19	81	62	24	86	62	34	96	62	53	115
31	22	53	32	25	57	36	27	63	38	28	66
17	44	61	28	34	62	29	35	64	29	35	64
16	12	28	17	13	30	18	14	32	18	14	32
10	12	22	12	14	26	13	15	28	13	15	28
228	140	368	243	157	400	250	183	433	252	212	464

Costs of safeguards programme co-ordination

Table L.4

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	331 600
Overtime	-
Sub-total	331 600
Common staff costs	118 460
Travel	16 050
Meetings	
Conferences, symposia, seminars	22 558
Technical committees, advisory groups	74 389
Representation and hospitality	3 265
Scientific supplies and equipment	357 563
Common services, supplies and equipment	94 480
Transfer of costs:	
Translation and records services	17 030
Printing and publishing services	14 432
Conference and contracts services	9 985
TOTAL	1 059 812

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
130 000	11 000	-	11 000	141 000	153 000	162 000
700	-	(100)	(100)	600	600	700
130 700	11 000	(100)	10 900	141 600	153 600	162 700
40 300	5 000	-	5 000	45 300	48 600	51 300
25 000	2 100	(9 000)	(6 900)	18 100	19 900	21 900
-	-	-	-	-	-	-
72 000	-	(72 000)	(72 000)	-	-	-
2 500	-	-	-	2 500	2 500	2 500
-	-	-	-	-	-	-
24 500	3 100	11 900	15 000	39 500	43 400	47 600
41 000	1 000	(28 000)	(27 000)	14 000	15 000	16 000
29 000	1 000	(20 000)	(19 000)	10 000	10 000	10 000
16 000	1 000	(17 000)	(16 000)	-	-	-
381 000	24 200	(134 200)	(110 000)	271 000	293 000	312 000

Costs of safeguards operations A

Table L.5

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 764 265
Overtime	-
Temporary assistance	908
Sub-total	2 765 173
Common staff costs	986 720
Travel	776 374
Representation and hospitality	3 207
Scientific supplies and equipment	1 711
Common services, supplies and equipment	161 189
Other items of expenditure	116
Transfer of costs:	
Translation and records services	31 702
Printing and publishing services	6 595
Legal services	75 000
TOTAL	4 807 787

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 662 000	278 000	-	278 000	2 940 000	3 691 000	3 937 000
500	100	(100)	-	500	600	700
-	-	2 500	2 500	2 500	2 800	3 200
2 662 500	278 100	2 400	280 500	2 943 000	3 694 400	3 940 900
825 500	115 200	-	115 200	940 700	1 181 200	1 259 500
950 000	105 000	114 000	219 000	1 169 000	1 435 000	1 626 000
2 000	200	-	200	2 200	2 400	2 600
-	-	-	-	-	-	-
80 000	6 500	(5 400)	1 100	81 100	118 000	120 000
-	-	-	-	-	-	-
4 000	1 000	(3 000)	(2 000)	2 000	2 000	2 000
12 000	1 000	(4 000)	(3 000)	9 000	10 000	11 000
55 000	2 000	(8 000)	(6 000)	49 000	53 000	57 000
4 591 000	509 000	96 000	605 000	5 196 000	6 496 000	7 019 000

Costs of safeguards operations B

Table L.6

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	3 127 071
Overtime	13
Temporary assistance	-
Sub-total	3 127 084
Common staff costs	1 116 894
Travel	788 947
Representation and hospitality	987
Scientific supplies and equipment	13 301
Common services, supplies and equipment	57 787
Transfer of costs:	
Translation and records services	2 096
Printing and publishing services	11 592
Legal services	75 000
TOTAL	5 193 688

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 691 000	196 000	29 000	225 000	1 916 000	2 282 000	2 577 000
200	-	100	100	300	400	400
-	-	500	500	500	600	800
1 691 200	196 000	29 600	225 600	1 916 800	2 283 000	2 578 200
524 800	79 500	8 900	88 400	613 200	730 700	824 300
400 000	41 800	84 200	126 000	526 000	666 000	765 000
2 000	100	-	100	2 100	2 300	2 500
-	-	-	-	-	-	-
100 000	7 800	(38 900)	(31 100)	68 900	77 000	80 000
2 000	-	-	-	2 000	2 000	2 000
8 000	1 000	(2 000)	(1 000)	7 000	8 000	9 000
55 000	2 000	(8 000)	(6 000)	49 000	52 000	56 000
2 783 000	328 200	73 800	402 000	3 185 000	3 821 000	4 317 000

Costs of safeguards operations C

Table L.7

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	-
Overtime	-
Temporary assistance	-
Sub-total	-
Common staff costs	-
Travel	-
Representation and hospitality	-
Common services, supplies and equipment	-
Other items of expenditure	-
Transfer of costs:	
Translation and records services	-
Printing and publishing services	-
Legal services	-
TOTAL	-

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 861 000	316 000	(45 000)	271 000	3 132 000	3 769 000	4 688 000
600	-	-	-	600	600	700
200	-	1 300	1 300	1 500	1 800	2 200
2 861 800	316 000	(43 700)	272 300	3 134 100	3 771 400	4 690 900
886 600	129 100	(14 900)	114 200	1 000 800	1 205 700	1 500 600
1 124 300	117 900	(398 200)	(280 300)	844 000	1 050 000	1 157 000
2 000	100	-	100	2 100	2 300	2 500
32 300	3 200	70 500	73 700	106 000	95 600	113 000
-	-	10 000	10 000	10 000	-	-
60 000	3 000	(18 000)	(15 000)	45 000	48 000	52 000
18 000	1 000	(2 000)	(1 000)	17 000	17 000	17 000
55 000	2 000	(8 000)	(6 000)	49 000	53 000	57 000
5 040 000	572 300	(404 300)	168 000	5 208 000	6 243 000	7 590 000

Costs of safeguards development and technical support

Table L.8

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 420 699
Consultants	2 502
Overtime	156
Sub-total	1 423 357
Common staff costs	507 521
Travel	32 621
Meetings	
Conferences, symposia, seminars	-
Technical committees, advisory groups	42 344
Representation and hospitality	2 279
Scientific and technical contracts	133 693
Scientific supplies and equipment	524 592
Common services, supplies and equipment	114 216
Other items of expenditure	123
Transfer of costs:	
Translation and records services	28 165
Printing and publishing services	44 687
Laboratory services	746 014
Conference and contracts services	4 279
TOTAL	3 603 891

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 782 000	249 000	16 000	265 000	2 047 000	2 506 000	2 816 000
64 900	4 400	63 000	67 400	132 300	54 400	50 000
700	-	-	-	700	800	900
1 847 600	253 400	79 000	332 400	2 180 000	2 561 200	2 866 900
552 100	97 900	5 000	102 900	655 000	802 400	901 300
65 500	7 500	9 000	16 500	82 000	87 000	92 000
36 000	-	(36 000)	(36 000)	-	-	-
53 000	6 000	16 000	22 000	75 000	79 000	90 000
5 800	200	(2 000)	(1 800)	4 000	4 400	4 800
740 000	50 000	(15 000)	35 000	775 000	853 000	928 000
1 580 000	205 000	2 312 000	2 517 000	4 097 000	5 432 000	6 470 000
129 000	13 000	55 000	68 000	197 000	217 000	238 000
-	-	-	-	-	-	-
52 000	4 000	(14 000)	(10 000)	42 000	46 000	48 000
49 000	4 000	57 000	61 000	110 000	44 000	48 000
1 068 000	90 000	9 000	99 000	1 167 000	1 272 000	1 365 000
22 000	1 000	(12 000)	(11 000)	11 000	13 000	14 000
6 200 000	732 000	2 463 000	3 195 000	9 395 000	11 411 000	13 066 000

Costs of safeguards information treatment

Table L.9

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 580 854
Consultants	16 086
Overtime	1 244
Temporary assistance	1 226
Sub-total	1 599 410
Common staff costs	564 735
Travel	18 626
Meetings	
Conferences, symposia, seminars	16 170
Technical committees, advisory groups	24 842
Representation and hospitality	1 581
Scientific and technical contracts	20 000
Scientific supplies and equipment	10 520
Common services, supplies and equipment	1 144
Other items of expenditure	710
Transfer of costs:	
Translation and records services	655
Printing and publishing services	18 750
Data processing services	1 805 090
Conference and contracts services	8 559
TOTAL	4 090 792

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 550 000	180 000	(4 000)	176 000	1 726 000	1 891 000	2 097 000
18 000	1 300	2 100	3 400	21 400	23 500	25 800
1 600	100	100	200	1 800	1 900	2 000
3 000	200	300	500	3 500	3 800	4 100
1 572 600	181 600	(1 500)	180 100	1 752 700	1 920 200	2 128 900
480 900	71 200	(1 500)	69 700	550 600	605 500	671 600
18 000	1 900	2 000	3 900	21 900	24 000	26 500
30 000	3 000	(2 000)	1 000	31 000	36 000	41 000
-	-	-	-	-	-	-
1 500	100	400	500	2 000	2 100	2 200
30 000	2 000	(2 000)	-	30 000	80 000	80 000
-	-	-	-	-	-	-
34 000	3 600	2 200	5 800	39 800	43 200	47 800
-	-	-	-	-	-	-
13 000	1 000	3 000	4 000	17 000	18 000	19 000
20 000	2 000	3 000	5 000	25 000	28 000	29 000
2 028 000	185 000	8 000	193 000	2 221 000	2 277 000	2 292 000
4 000	-	-	-	4 000	4 000	5 000
4 232 000	451 400	11 600	463 000	4 695 000	5 038 000	5 343 000

Costs of safeguards evaluation

Table L.10

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	412 563
Consultants	-
Overtime	541
Sub-total	413 104
Common staff costs	147 117
Travel	-
Meetings	
Technical committees, advisory groups	-
Representation and hospitality	345
Common services, supplies and equipment	-
Transfer of costs:	
Translation and records services	131
Printing and publishing services	2 261
Conference and contracts services	-
TOTAL	562 958

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
890 000	86 000	21 000	107 000	997 000	1 320 000	1 451 000
1 600	100	40 300	40 400	42 000	56 200	31 400
1 600	200	-	200	1 800	1 900	2 000
893 200	86 300	61 300	147 600	1 040 800	1 378 100	1 484 400
275 400	40 000	5 700	45 700	321 100	422 100	464 500
12 100	1 300	2 400	3 700	15 800	18 000	20 000
12 000	1 300	15 700	17 000	29 000	32 000	36 000
1 100	100	(200)	(100)	1 000	1 200	1 400
4 200	500	600	1 100	5 300	6 600	7 700
-	-	1 000	1 000	1 000	1 000	2 000
5 000	-	5 000	5 000	10 000	11 000	12 000
4 000	-	(1 000)	(1 000)	3 000	4 000	3 000
1 207 000	129 500	90 500	220 000	1 427 000	1 874 000	2 031 000

Costs of safeguards standardization, training and administrative support

Table L.11

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	350 190
Consultants	9 924
Overtime	-
Sub-total	360 114
Common staff costs	125 100
Travel	518
Meetings	
Technical committees, advisory groups	-
Representation and hospitality	217
Common services, supplies and equipment	-
Transfer of costs:	
Translation and records services	20 436
Printing and publishing services	36 422
Conference and contracts services	-
TOTAL	542 807

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
694 000	40 000	6 000	46 000	740 000	900 000	985 000
-	-	-	-	-	-	-
700	100	(100)	-	700	800	800
694 700	40 100	5 900	46 000	740 700	900 800	985 800
215 500	18 200	1 800	20 000	235 500	287 600	315 700
10 500	1 000	100	1 100	11 600	12 800	14 100
-	-	89 000	89 000	89 000	96 000	107 000
1 300	100	1 600	1 700	3 000	3 400	3 800
3 000	-	14 200	14 200	17 200	30 400	36 600
35 000	3 000	4 000	7 000	42 000	45 000	48 000
32 000	2 000	13 000	15 000	47 000	49 000	52 000
-	-	2 000	2 000	2 000	3 000	4 000
992 000	64 400	131 600	196 000	1 188 000	1 428 000	1 567 000

Costs of International plutonium storage study

Table L.12

Item of expenditure	1981 Actual obligations
Salaries and wages	
Consultants	-
Temporary assistance	-
Sub-total	-
Travel	-
Meetings	
Technical committees, advisory groups	-
Representation and hospitality	-
Common services, supplies and equipment	-
Transfer of costs:	
Translation and records services	-
Printing and publishing services	-
Legal services	-
Conference and contracts services	-
TOTAL	-

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
173 000	14 000	-	14 000	187 000	201 900	218 100
40 000	3 400	-	3 400	43 400	47 000	50 800
213 000	17 400	-	17 400	230 400	248 900	268 900
-	-	20 600	20 600	20 600	22 600	25 100
-	-	40 000	40 000	40 000	46 000	53 000
1 800	100	(100)	-	1 800	1 900	2 000
4 200	500	(500)	-	4 200	4 600	5 000
26 000	2 000	(1 000)	1 000	27 000	29 000	32 000
26 000	1 000	(1 000)	-	26 000	30 000	33 000
-	-	24 000	24 000	24 000	26 000	28 000
3 000	-	1 000	1 000	4 000	1 000	1 000
274 000	21 000	83 000	104 000	378 000	410 000	448 000

SUB-PROGRAMME L.1

Safeguards operations

OBJECTIVE

L.1/1. The objective is to apply safeguards pursuant to agreements in connection with NPT and with the Tlatelolco Treaty and to unilateral submission agreements, safeguards transfer agreements and project agreements concluded under the Agency's Safeguards System (1965, as Provisionally Extended in 1966 and 1968), the main activities involved in fulfilling this objective including:

(a) Collection, examination and verification of design information;

(b) Implementation of inspections for the purpose of verifying information received from States and the application of containment and surveillance measures;

(c) Evaluation of inspection results and formulation of technical conclusions on the verification activities;

(d) Technical preparation of subsidiary arrangements; and

(e) Elaboration and updating of safeguards implementation practices.

RESULTS TO DATE

L.1/2. At present, safeguards agreements are in force with 87 States. Safeguards are actually being applied in 51 States, the nuclear activities of the remainder not yet having reached the stage at which reports and verification activities are required under the relevant agreements [L.1].

L.1/3. By far the major part of the nuclear material under safeguards is in States that have submitted all their peaceful nuclear activities to safeguards as a consequence of their being party to NPT or to NPT and the Tlatelolco Treaty.

L.1/4. During the period from 1978 to 1981, about 4000 inspections were carried out. During the same period certain facilities in three countries were under continuous inspection.

L.1/5. A Regional Office was established in Toronto, Canada, in 1980. During 1981, three Agency inspectors were resident in Japan. These arrangements enabled the Agency to save manpower and financial resources.

PLANS FOR 1983-84

L.1/6. The workload is expected to increase moderately as a result of the expansion of nuclear activities in States having safeguards agreements with the Agency.

[L.1] The safeguards agreement concluded with Egypt in connection with NPT has not yet entered into force.

Nuclear installations subject to safeguards or containing safeguarded nuclear material
(excluding installations to be covered by agreements concluded
pursuant to voluntary offers made by nuclear-weapon States)
Status as of 31 December 1981 and forecast for 1982-85

Table L.13

Type of installation	1981		1982	
	NPT agreements	Other agreements	NPT agreements	Other agreements
Power reactors	106	24	108	24
Research reactors and critical assemblies	149	27	151	27
Conversion plants	3	1	4	1
Fuel fabrication plants	31	7	31	7
Reprocessing plants	4	2	4	2
Enrichment plants	4	0	4	0
Separate storage facilities	18	6	18	6
Other facilities (> 1 ekg)	40	0	40	0
Other locations (≤ 1 ekg)	402	20	402	20
TOTAL	757	87	762	87

Amounts of nuclear material under Agency safeguards
(excluding nuclear material to be safeguarded under agreements
concluded pursuant to voluntary offers made by nuclear-weapon States)
Status as of 31 December 1981 and forecast for 1983 and 1988

Table L.14

Material	Amounts (tonnes)		
	1981	1983	1988
Plutonium	76	110-120	270-300
Uranium enriched to 20% or more	10	10	10
Uranium enriched to less than 20%	15 459	19 000-21 000	28 000-33 000
Source material	22 183	26 000-28 000	40 000-45 000

NEW DEVELOPMENTS FORESEEN FOR 1985-88

L.1/7. A further slow increase in the workload is expected, due to the increase in the number of facilities (see Table L.13) and in the quantities of nuclear material (see Table L.14) under safeguards. The Agency's safeguards activities will be directed towards more systematic use of sophisticated inspection equipment.

CO-OPERATION WITH OTHER ORGANIZATIONS

L.1/8. The effective implementation of this sub-programme will continue to depend on the co-operation of national and regional authorities responsible for administering States' systems of accounting for and control of nuclear material (SSACs) and for the management of safeguarded facilities. The co-operation of States in providing training in specialized fields will continue to be sought.

1983		1984		1985	
NPT agreements	Other agreements	NPT agreements	Other agreements	NPT agreements	Other agreements
116	24	134	25	146	26
151	27	153	28	154	28
4	1	4	1	5	1
32	7	32	8	32	8
4	3	4	3	5	3
5	1	6	1	6	1
18	6	18	6	18	6
40	0	40	0	40	0
402	20	402	20	402	20
772	89	793	92	808	93

SUB-PROGRAMME L.2

Safeguards development and technical support

OBJECTIVE

L.2/1. The objective is to provide concepts, procedures, techniques, equipment and technical support for achieving the technical objectives of safeguards in the most effective and economical way, the main activities involved in fulfilling this objective including:

(a) (Technical services) - Direct support for operational activities through the provision of technical services such as the procurement, storage, testing, calibration, maintenance, servicing, shipment and installation of safeguards instruments and equipment, the instruction of inspectors, arrangements for the shipment and analysis of samples, supervision of the programme of and the work performed at the Agency's Safeguards Analytical Laboratory, the specification and procurement of physical standards and reference materials and the formulation of procedures for implementing techniques for containment, surveillance and nuclear material measurement and accountancy;
(b) (Development of instruments, methods and techniques) - Support for operational activities through the development, optimization and introduction into operational use of destructive and non-destructive assay instruments and techniques, surveillance instruments, containment techniques and seals and through the co-ordination of research and development in those fields; and
(c) (System studies) - The improvement of safeguards effectiveness through the further development, the refinement and the evaluation of safeguards objectives, concepts, approaches and criteria and the forecasting of fuel cycle activities and of inspection and consequent manpower requirements.

Technical services

RESULTS TO DATE

L.2/2. The acquisition and maintenance of an adequate inventory of equipment for non-destructive analysis (NDA) and for containment and surveillance (C/S), and the provision of training in equipment usage have remained the major activities in the Technical Services Section. Careful consideration has been given to immediate needs, on-going developments, standardization requirements and repair and maintenance possibilities. At the same time, there has been a continuing improvement in the performance and the availability of equipment, and the level at which it is maintained is being constantly upgraded. There has been a definite trend towards having training for maintenance staff provided by equipment manufacturers. Presentations at safeguards inspector training courses have been constantly revised and improved.

L.2/3. The Safeguards Instrument Laboratory (SIL) at Seibersdorf has continued to serve as an important facility for inspector training in the use of NDA equipment and for the maintenance and calibration of such equipment.

L.2/4. Delays in the transport of inspection samples to Vienna or to the network of analytical laboratories has continued to be a matter of major concern.

L.2/5. A procedure for verifying type-E seals which was introduced in 1979 and was based on the projection of photographic images is being replaced by a technique involving a higher degree of automation. Type-E seals with a double cap and hence a greater tamper resistance have been introduced for routine use.

L.2/6. The quality of results derived from high-resolution gamma-ray spectroscopy, particularly for plutonium isotopic determinations, has improved, but is still considered unsatisfactory.

L.2/7. There has been an improvement in the reliability of the photographic and video equipment employed for safeguards, but the overall performance level is still lower than desired.

PLANS FOR 1983-84

L.2/8. The Technical Services Section will continue to provide safeguards inspectors with the equipment they need, properly maintained and calibrated, and to perform services relating to the destructive analysis of inspection samples. A quality assurance programme will be implemented to ensure proper use is made of available equipment and to reveal any serious deficiencies that might exist.

L.2/9. Efforts will be made to get Member States to license a portable air transport container for the shipment of inspection samples and to promote rationalization of air transport regulations for radioactive material in order to reduce the long delays presently experienced in safeguards destructive analysis operations.

L.2/10. The improved photographic and video surveillance equipment originally planned to be introduced in 1981-82 will now be brought into service between 1982 and 1984. Reliability will then be markedly improved, as will the quality of the surveillance records. This equipment will include two video surveillance systems, one for general-purpose use and one specifically developed for CANDU reactors. Both are microprocessor-controlled and gain their reliability through redundancy of components.

Development of instruments, methods and techniques

RESULTS TO DATE

L.2/11. Cerenkov glow measurement devices for the attribute inspection of irradiated fuel have been tested, evaluated and put into operational use.

L.2/12. A prototype analysis unit has been developed, tested and evaluated for the in-field analysis of high-resolution gamma-spectra from plutonium-bearing materials.

L.2/13. A variety of underwater surveillance devices have been field tested. These include underwater television, a periscope and a simple surface viewing tray to facilitate the use of binoculars. Most underwater viewing situations likely to be encountered are expected to be covered by at least one of these devices.

L.2/14. Improved optical surveillance systems (television and film) have been developed and laboratory tests on them have been successfully completed.

L.2/15. Field tests have been carried out on active and passive neutron coincidence counters with the aim of more completely defining their range of application and the procedures for their use.

L.2/16. Equipment and procedures for the independent weighing of UF_6 shipping cylinders (2.5 tonnes) have been developed and field tested.

L.2/17. Laboratory tests and demonstrations have been completed on equipment items developed explicitly for the on-load reactor safeguards approach. They include an eight-camera closed-circuit television system, film cameras triggered by motion or radiation as well as on a time sequence, irradiated bundle counters and fresh-fuel-bundle counters.

L.2/18. Prototypes of a microprocessor-controlled, battery-powered, multi-channel analyser intended to become the standard Agency tool for attribute measurements and for some variable measurements have been developed and demonstrated.

L.2/19. A test and demonstration exercise on advanced safeguards techniques as applied in reprocessing plants has been completed. The programme (TASTEX) consisted of 13 tasks - including the use of C/S and NDA instruments, a near-real-time accounting study and the development of resin-bead preparation procedures. Five of these tasks have been identified as being sufficiently proven to make possible implementation in the near future. These include

certain surveillance techniques applied in the spent fuel storage area, concentration and isotopic measurements of plutonium product solutions and the use of electromanometers to monitor accountability tank levels in an accurate and continuous manner.

PLANS FOR 1983-84

L.2/20. Efforts will be devoted to introducing more reliable, simple-to-operate NDA instrumentation (Table L.16, No.2). The goal will be to develop microprocessor-controlled instrumentation that provides in situ analysis in terms of the quantity of interest to the inspector (enrichment, isotopic fraction, grams of material) and to improve data analysis algorithms. The microprocessor will also provide built-in measurement quality control by leading the inspectors through the necessary procedures. These capabilities will eventually be integrated into the battery-powered multichannel analyser (MCA), the 4000-channel high-resolution MCA, the integrated spent fuel measurement electronics and all the neutron coincidence counting systems.

L.2/21. To provide for better quality control and more efficient use of Agency resources, all NDA instrumentation (portable, transportable and installed) will be developed or modified to include a standardized data link to larger or more general-purpose Agency computers.

L.2/22. In view of the increasing availability of suitable NDA instruments, facility-type-specific procedures that optimize their deployment will be developed.

L.2/23. A number of in-plant instruments will be utilized by the Agency to obtain safeguards information. These instruments will be under the control of the facility operator, who will also be responsible for their maintenance. Independent authentication techniques will be developed to verify that the instruments, physical standards and software have not been tampered with (see Table L.15, No.1).

L.2/24. New optical surveillance systems will continue to be developed to keep pace with advances in technology.

L.2/25. The systematic evaluation of criteria for the emplacement, operational use and review of optical surveillance equipment will continue. Training films taken in facilities and showing normal and simulated abnormal operations will be produced to assist in the review phase.

L.2/26. The potential of various monitors for maintaining surveillance over containers, items, areas or penetrations into control areas will be investigated (Table L.16, No.3).

L.2/27. As new seals (electronic, underwater, in situ verifiable, and fuel assembly types) become available (possibly as field-testable versions), their mode of application for optimum cost effectiveness and minimum facility intrusion will be investigated and their use will be implemented.

System studies

RESULTS TO DATE

L.2/28. A comprehensive study of safeguards approaches has been completed for the main types of nuclear facilities; the development of advanced safeguards concepts applicable to large-scale facilities is continuing.

L.2/29. The preparation of practical guidelines for inspection activities has been initiated, with special emphasis on nuclear facilities which process and handle materials from which nuclear explosive devices could readily be made.

L.2/30. Work has continued on detailed guidelines on the implementation and maintenance of SSACs for some specific facilities.

L.2/31. The principles of a methodology for the evaluation of safeguards effectiveness have been developed and good progress has been made in their application to specific facility types.

L.2/32. Progress has been achieved in the development of facility design guidelines intended to make the application of safeguards easier and more effective.

L.2/33. A computer-based approach to the long-term forecasting of nuclear material and facilities under safeguards and of manpower requirements has been completed. Work is continuing on the development of a methodology for optimizing the allocation of inspection effort.

PLANS FOR 1983-84

L.2/34. Models for the safeguarding of different types of nuclear facilities will be continuously updated (Table L.16, Nos 4 and 5).

L.2/35. Safeguards approaches based on advanced concepts and methods aimed at increasing the cost-effectiveness of safeguards implementation will be defined.

L.2/36. Safeguards concepts and methods which are applicable to multiple-facility nuclear fuel cycles and take into account the inter-relations between nuclear fuel cycle facilities both within a State and in different States will be developed (Table L.16, No.6).

L.2/37. Methodologies for evaluating safeguards effectiveness, including C/S quantification, will be further developed and implemented.

L.2/38. Nuclear facility design guidelines to aid safeguards implementation (minimizing the intrusiveness and increasing the cost-effectiveness of safeguards measures) will be formulated (Table L.16, No.7).

L.2/39. Detailed guidelines for the implementation and maintenance of SSACs for specific facilities will be developed.

L.2/40. Guidance for the practical application of updated safeguards approaches and advanced safeguards methods will be developed.

L.2/41. A methodology for optimizing the allocation of inspection effort at both facility and State level will be developed and implemented.

L.2/42. Forecasts will be made of future Agency manpower requirements and of amounts of nuclear material and numbers of facilities likely to be under safeguards.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

L.2/43. On the basis of the experience gained during the previous years, the programme for the development of instruments, methods and techniques will be continuously reviewed to ensure that the most effective equipment is available to meet the Agency's obligations at minimum cost to the Agency and Member States.

L.2/44. Particular emphasis will be placed on the safeguarding of large-scale nuclear facilities and on the definition of complete safeguards approaches and methods for multiple-facility nuclear fuel cycles, both within a single State and within several States.

L.2/45. It is expected that Member States will continue their programmes of assistance to the Agency in the development, testing and acquisition of

safeguards instruments and in the development and implementation of safeguards approaches and techniques.

CO-OPERATION WITH OTHER ORGANIZATIONS

L.2/46. Safeguards research and development work has been significantly promoted and accelerated by the comprehensive assistance of several Member States. In this regard, specific mention should be made of the national support programmes of Australia, Canada, the Federal Republic of Germany, Japan, the United Kingdom and the United States of America, the International Working Group on Reprocessing Plant Safeguards, the Hexapartite Safeguards Project related to ultracentrifuge uranium-235 enrichment plants and the Tokai Advanced Safeguards Technology Exercise related to reprocessing plants.

SUB-PROGRAMME L.3

Safeguards information treatment

OBJECTIVE

L.3/1. The objective is to maintain a high level of operational capability in the Agency computerized safeguards information system (ISIS) for the processing of the data essential for the purposes of safeguards and for the provision of information services to the staff and management of the Department of Safeguards.

Data processing development

RESULTS TO DATE

L.3/2. The Agency's International Safeguards Information System (ISIS) was put into test operation at the beginning of 1979 in parallel with the previous data processing system (PSI-2). During 1980, software was developed to meet the demand for further data services in connection with other areas of safeguards such as seals, containment and surveillance equipment and management information. The transition to ISIS was completed in January 1981.

L.3/3. An IBM-3033S computer, dedicated solely to safeguards data processing, was acquired and installed at the end of 1981 for use with the existing VAX-11/750 data entry computer and the ADABAS version 4.1 data base management system. The necessary programs were developed and tested.

L.3/4. Development work was started on an efficient sub-system for the accounting of nuclear material in transit and on the computerization of LWR inspection reports.

PLANS FOR 1983-84

L.3/5. A scheme for the integrated use of computers in safeguards data processing will be implemented with the aim of introducing and utilizing computing devices in the field and of standardizing and enhancing the information flow from the field to Headquarters. This will help to increase further the efficiency and effectiveness of the application of safeguards.

Data processing operations

RESULTS TO DATE

L.3/6. By the end of 1981, the ISIS data base contained around 2 million

records (accounting, design, inspection and other data). It had 150 users within the Department of Safeguards, trained to access the data base remotely.

PLANS FOR 1983-84

L.3/7. With the introduction of the computerized sub-system for the accounting of nuclear material in international transit and with the computerization of the new inspection report, the full capabilities of ISIS will be realized and the system will provide a variety of data processing services to safeguards inspectors and to the administration within the framework of effective safeguards implementation.

SUB-PROGRAMME L.4

Safeguards evaluation

OBJECTIVE

L.4/1. The objective is to carry out independent assessments of safeguards statements to be transmitted to individual countries, to ensure a continuing evaluation of the effectiveness of safeguards activities, to provide data evaluation services and to recommend the improvement of the safeguards system where it is deemed necessary, the main activities involved in fulfilling this objective including:

(a) The provision of data evaluation services, review of inspection reports, analysis of the difficulties encountered in the planning and implementation of inspections and the formulation of proposals for improvements in inspection activities;

(b) The monitoring of all activities relating to evaluation of the effectiveness of the safeguards system;

(c) Guiding the evaluation process and co-operating with other units within the Agency in improving the safeguards system and the effectiveness of safeguards implementation;

(d) Continuous evaluation of the effectiveness of safeguards implementation; and

(e) The formulation of conclusions regarding safeguards effectiveness, particularly in the Safeguards Implementation Report.

RESULTS TO DATE

L.4/2. From 1978 to 1981, the following number of inspection reports and statements or letters were processed (the numbers in parentheses are the fraction clarified or corrected as a result of processing):

	1978	1979	1980	1981
Inspection reports	804(86%)	1058(52%)	1097(37%)	1119(31%)
NPT statements relevant to				
para. 90(a) of INFCIRC/153	332(88%)	852(40%)	853(28%)	874(24%)
para. 90(b) of INFCIRC/153	164(18%)	90(39%)	131(31%)	141(22%)
Conclusion letters relevant to				
INFCIRC/66-type agreements	116(1%)	77(3%)	80(2%)	81(2%)

L.4/3. A Safeguards Implementation Report (SIR) was compiled for each of the years 1977-80.

L.4/4. A programme for improving the concepts employed in computing, analysing and presenting the overall effectiveness of Agency safeguards in an increasingly quantitative and objective manner has been conducted in

conjunction with the preparation of the SIRs. This programme has led to a steady improvement in the clarity and credibility of the SIRs.

L.4/5. A temporary method for gathering most of the information required for the SIRs was introduced in 1978; early in 1979, a computerized mechanism was introduced to facilitate the collecting and processing of some of that information on a more routine basis. Computerization of data has proved to be very useful. The earlier, temporary method has not been completely replaced, but improvements have been made and the relative size of the part that is not computerized has decreased each year.

L.4/6. A long-term programme has been initiated for the development and testing of a methodology for the evaluation of the effectiveness of safeguards implementation. An Advisory Group considered the results of this effort in December 1981 and made recommendations that it should be continued.

L.4/7. Numerous inspection sample plans were prepared by means of the INSPECT computer code. The code is now available on the terminals in different sections of the Department.

L.4/8. A large number of samples were received and analysed at the Safeguards Analytical Laboratory (SAL) and routine measurements were made of their element and isotope concentrations. For 1979-81, these data together with the corresponding operators' data resulted in a total of 16 000 measurements, processed and evaluated using computer codes designed to detect discrepancies and measurement bias. Improved computer codes for evaluation were brought into use.

L.4/9. Considerable attention was given to the statistical evaluation of tank calibration data from reprocessing plants in connection with the TASTEX programme (L.2/19).

L.4/10. Procedures for characterizing physical standards for the calibration of NDA instruments were provided and data evaluations performed to establish the reference values. Statistical procedures for estimating the random and systematic errors of inspection and facility measurements were improved with the assistance of experts from Member States, and the software was put into use during 1981. Initial work was started on a measurement error data bank.

L.4/11. Progress was achieved in the implementation of isotope correlation procedures to verify uranium burn-up and plutonium production in spent fuel reprocessing. The software was tested successfully and can now be used for each reprocessing campaign.

L.4/12. Software for data evaluation on the VAX-IBM system was improved for a number of applications. Two MINC-11 minicomputers were installed, one for the Toronto Field Office and one at Headquarters for developing and testing software for use in the field. The initial work was on software for evaluating NDA data, camera surveillance data, and reprocessing plant data for the verification of feed, product and plant hold-up.

PLANS FOR 1983-84

L.4/13. The reviewing of inspection reports, of NPT statements and of conclusion letters relevant to INFCIRC/66-type agreements will continue. It is expected that approximately 1400 inspection reports will be reviewed each year. The effort on quality assurance will be expanded to obtain more information from the inspection reports, to be used partly for the preparation of SIRs and partly for internal management purposes. Efforts will be initiated to identify and analyse specific problems arising from safeguards implementation, using in some cases procedures similar to those used by an internal auditor, in order to strengthen the existing quality control functions of safeguards management.

L.4/14. The introduction of computerized methods for the routine collection and processing of data on inspection activities at facilities under safeguards

will continue. This should lead to a more systematic evaluation of the effectiveness of safeguards implementation.

L.4/15. Further efforts will concentrate on about 25 important bulk handling facilities with the aim of improving procedures for data collection, data evaluation and the preparation of output reports for direct inclusion in the inspection report.

L.4/16. A significant increase in data evaluation is expected as the NDA implementation plan is realized with the expected result that evaluated data can be summarized for inspection reports and for the annual Safeguards Implementation Report.

L.4/17. Increased attention will be given to statistical procedures for estimating the quality of NDA measurements in order to define target values for random and systematic errors in destructive and non-destructive measurements and to establish a measurement error data bank for all combinations of materials and measurement methods (Table L.16, No.8).

L.4/18. Data evaluation in the field using small computing devices will be developed. Major attention will be given to the evaluation of post-inspection data for bulk facilities.

L.4/19. At least three major training courses involving considerable staff participation are expected during each year.

NEW DEVELOPMENTS FORESEEN FOR 1985-1988

L.4/20. The activities described under "PLANS FOR 1983-84" will be extended to include the performance of all safeguards effectiveness evaluation functions, especially those made possible by the results of the above-mentioned long-term programme.

SUB-PROGRAMME L.5

Standardization, training and administrative support

OBJECTIVE

L.5/1. The objective is:

(a) To review management policy and practices and to co-ordinate departmental and budgetary procedures and practices;

(b) To develop guidelines and regulations on the basis of technical assessments and to carry out technical reviews with particular reference to subsidiary arrangements; and

(c) To provide executive-level assistance to the Deputy Director General of the Department and to draft or edit safeguards documents.

(d) To make all the training arrangements for staff of the Department of Safeguards and, where appropriate, for personnel of Member States in relation to their obligations under Agency safeguards agreements.

RESULTS TO DATE

L.5/2. A number of initiatives have been taken to review and improve the management procedures and information systems within the Department.

L.5/3. Safeguards agreements and subsidiary arrangements have been negotiated.

L.5/4. With the aim of promoting better understanding, within the Agency and in Member States, of certain important aspects of safeguards, a start has been made on the production of a new safeguards information series of documents in which, so far, three items have appeared.

L.5/5. The Safeguards Training Unit was established in February 1980 and became a separate Section in October 1981. During the first year of operation approximately 510 participants (inspectors, other safeguards staff and staff from other Agency Departments and from Member States) attended 21 different courses, including two courses on SSACs and one workshop seminar on safeguards information.

L.5/6. The last four years have seen a great advance in the quality of the training given to safeguards inspectors. In-house training is now being supplemented by courses in certain Member States. These provide the inspector with the equivalent of an in-field environment for training in equipment usage and safeguards procedures.

PLANS FOR 1983-84

L.5/7. The negotiation of safeguards agreements and, in particular, subsidiary arrangements is expected to continue to represent a significant effort. The routine activities of the Section, such as providing the secretariat to the Standing Advisory Group on Safeguards Implementation (SAGSI) and preparing major departmental documents, will continue.

L.5/8. Administrative and technical practices and procedures contained in the Safeguards Manual will be thoroughly revised and updated to provide a clear and complete set of operational procedures for safeguards implementation.

L.5/9. The departmental security procedures will continue to be reviewed and improved.

L.5/10. Job descriptions will be prepared, classification of posts carried out and working conditions, especially those of inspectors, reviewed.

L.5/11. Various courses at different levels, including annual workshop seminars (Annex I(17) and Annex II(19)), will be held for safeguards inspectors, other staff of the Department and personnel from Member States working in safeguards-related areas. The purpose of these courses is:

to develop entry-level skills in appropriate safeguards areas;
to develop specific skills needed on the job; and
to update skills as technological procedures and safeguards activities change.

L.5/12. Individualized training will be given to inspectors through the use of videotapes, which constitute the major medium for such training.

L.5/13. Individual training records will be kept and a systematic evaluation made of training results, requirements and effectiveness.

Co-ordinated research programmes

Table L.15

Co-ordinated programme title	Number of		Year initiated	Probable year of completion
	Contracts	Agreements		
1. Use of installed instrumentation at fuel reprocessing facilities for safeguards purposes	-	5	1977	1985

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table L.16

No.	Document	Users	Source	Year of issue	Paragraph
1.	Internal reports with advice and recommendations relating to safeguards implementation	Director General; Department of Safeguards	SAGSI 83/1,2 and 84/1,2	Each Year	L/12
2.	Report with recommendations on the use of gamma-ray spectrometry analysis of plutonium samples for safeguards purposes	As above	AG 83/3	1983	L.2/20
3.	Report with recommendations concerning monitors and sensors used for containment and surveillance and means for their development and implementation	As above	AG 84/3	1984	L.2/26
4.	Report on application of safeguards to heavy-water production plants	As above	AG 83/4	1984	L.2/34
5.	Report with recommendations on safeguarding uranium enrichment centrifuge plants	As above	AG 84/4	1985	L.2/34
6.	Report on safeguards application to different types of fuel cycle	As above	AG 84/5	1985	L.2/36
7.	Report with recommendations on nuclear facility design to aid safeguards implementation	As above	AG 83/5	1984	L.2/38
8.	Reports on evaluations of the quality of data resulting from analytical measurements made with non-destructive and destructive techniques	As above	AG 83/6 AG 84/6	1984 1985	L.4/17

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983		Paragraph
1-2.	Standing Advisory Group on Safeguards Implementation (SAGSI)	L/12
3.	Advisory Group on the non-destructive determination of the isotopic contents of plutonium samples	L.2/20
4.	Advisory Group on safeguarding heavy-water production plants	L.2/34
5.	Advisory Group on design criteria for nuclear facilities to aid safeguards implementation	L.2/38
6.	Advisory Group on evaluation of the quality of safeguards analytical measurements	L.4/17

1984		Paragraph
1-2.	Standing Advisory Group on Safeguards Implementation (SAGSI)	L/12
3.	Advisory Group on C/S monitors and sensors and their applications in international safeguards	L.2/26
4.	Advisory Group on safeguarding uranium enrichment plants	L.2/34
5.	Advisory Group on the application of safeguards to a multiple-facility nuclear fuel cycle	L.2/36
6.	Advisory Group on evaluation of the quality of safeguards NDA measurements	L.4/17

M. INFORMATION AND TECHNICAL SERVICES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table M.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 597 233
Consultants	13 063
Overtime	4 663
Temporary assistance	44 390
Sub-total	2 659 349
Common staff costs	919 373
Travel	20 565
Meetings	
Conferences, symposia, seminars	5 441
Technical committees advisory groups	46 176
Representation and hospitality	925
Scientific and technical contracts	73 214
Common services, supplies and equipment	2 744 426
Other items of expenditure	19 185
Transfer of costs:	
Translation and records services	53 338
Printing and publishing services	1 075 679
Data processing services	(3 374 719)
Conference and contracts services	8 559
TOTAL	4 251 511

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 968 000	241 000	14 000	255 000	3 223 000	3 572 000	3 857 000
10 200	800	800	1 600	11 800	13 000	23 700
16 300	1 600	700	2 300	18 600	28 400	21 600
46 000	4 200	46 900	51 100	97 100	113 000	114 300
3 040 500	247 600	62 400	310 000	3 350 500	3 726 400	4 016 600
919 400	107 700	5 000	112 700	1 032 100	1 142 700	1 234 000
32 200	3 400	1 400	4 800	37 000	45 900	51 400
19 000	2 000	-	2 000	21 000	23 000	23 000
60 000	5 000	(15 000)	(10 000)	50 000	48 000	69 000
3 700	200	(200)	-	3 700	4 100	4 300
61 000	4 500	21 500	26 000	87 000	125 000	136 000
2 583 200	223 800	407 800	631 600	3 214 800	3 490 000	3 700 200
39 000	3 500	5 400	8 900	47 900	59 900	80 500
64 000	5 000	(1 000)	4 000	68 000	72 000	98 000
928 000	85 000	(51 000)	34 000	962 000	1 208 000	1 423 000
(3 351 000)	(311 000)	(488 000)	(799 000)	(4 150 000)	(4 571 000)	(4 858 000)
11 000	2 000	11 000	13 000	24 000	10 000	11 000
4 410 000	378 700	(40 700)	338 000	4 748 000	5 384 000	5 989 000

SUMMARY OF MANPOWER

Table M.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	5	5	5	1	6	6	6
P-4	10	11	11	(1)	10	10	10
P-3	15	16	16	8	24	24	24
P-2	4	4	4	7	11	11	11
P-1	2	3	3	3	6	6	6
Sub-total	37	40	40	18	58	58	58
GS	80	81	81	(17)	64	66	68
TOTAL	117	121	121	1	122	124	126

CHANGES IN COSTS AND MANPOWER

Costs

M/1. As will be seen from Table M.1 above, it is expected that the cost of this programme will increase by $338 000 as a net result of salary and other price increases of $378 700 and a programme decrease of $40 700.

M/2. The programme increase of $19 000 in respect of salaries for established posts and common staff costs is attributable to the addition of one GS post for the Library in 1983. Programme increases are foreseen in respect of consultants' services ($800), overtime ($700), temporary assistance ($46 900, mainly for the "Computer services" sub-programme) and travel ($1400).

M/3. With regard to the cost of meetings, a programme decrease of $15 000 is foreseen in respect of Technical Committee and Advisory Group meetings for the "INIS" sub-programme (the number of which will be reduced by one). The programme increases in respect of scientific and technical contracts ($21 500) and common services, supplies and equipment ($407 800) are connected with the "Computer services" sub-programme. The latter amount is directly attributable to an enlargement of the data processing facilities, which has resulted in higher allocated costs. The programme increase of $5400 (for training) under "Other items of expenditure" is related to the "Library" and the "Computer services" sub-programmes.

M/4. As regards the allocation of service costs, programme decreases are foreseen in linguistic services ($1000) and in printing and publishing services ($51 000, the net result of a larger decrease for "INIS", partly offset by an increase for the "Scientific journals" sub-programme). The programme increase of $11 000 in respect of conference and contracts services is related to the "INIS" sub-programme. The amount of $488 000 which appears

under "Data processing services" in Table M.1 represents a programme increase in computer services provided to other programmes. In addition, there is a programme increase in respect of services provided to other sub-programmes of the present programme. The total programme increase in respect of the "Computer services" sub-programme, as shown in Table M.7, amounts to $503 000.

M/5. It is expected that income from INIS publications (including microfiche) will be $550 000 in 1983.

Manpower

M/6. As will be seen from Table M.2 above, one GS post will have to be added for the Library in 1983. In addition, the upgrading of one P-4 post to the P-5 level for the head of the INIS Subject Control unit and the upgrading of one GS post to the P-3 level for a computer administration officer are foreseen. Further, the upgrading of 17 GS posts to the P-3 (seven), P-2 (seven) and P-1 (three) levels is foreseen as a result of a classification survey for data processing specialists. Detailed justifications are given in Annex IV.

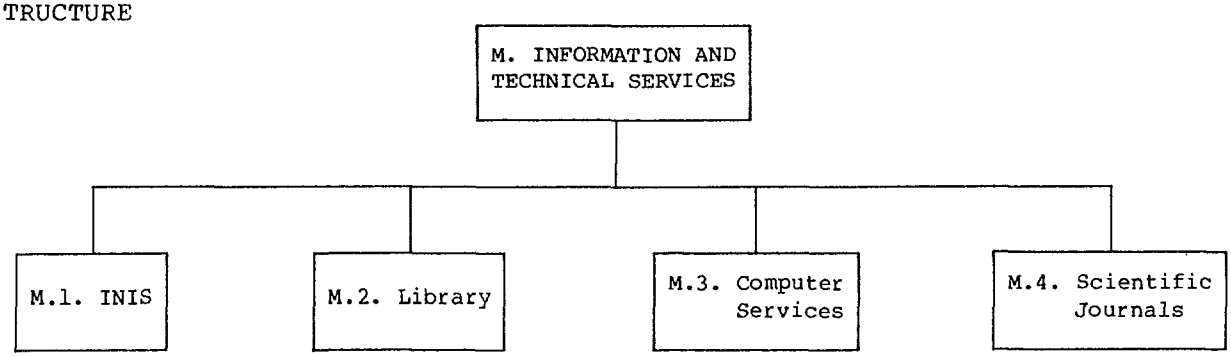
M/7. For 1984, the addition of two GS posts for Computer services will be required. For 1985, the addition of one GS post each for the "INIS" and the "Computer services" sub-programmes is foreseen.

THE PROGRAMME

OBJECTIVE

M/8. The objective is to foster the exchange of scientific and technical information on peaceful uses of atomic energy by assembling such information and disseminating it to Member States, Agency staff and interested international organizations, and to provide library and computer support to all organizations located in the Vienna International Centre.

STRUCTURE



Costs of the Director's office

Table M.3

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	92 038
Sub-total	92 038
Common staff costs	32 879
Travel	2 440
Representation and hospitality	208
Common services, supplies and equipment	1 393
Transfer of costs:	
Printing and publishing services	2 267
TOTAL	131 225

Costs of scientific journals

Table M.4

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	80 957
Consultants	-
Temporary assistance	2 671
Sub-total	83 628
Common staff costs	28 921
Travel	890
Representation and hospitality	35
Scientific and technical contracts	14 250
Common services, supplies and equipment	686
Transfer of costs:	
Translation and records services	46 374
Printing and publishing services	423 260
Data processing services	5 740
TOTAL	603 784

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
100 000	8 000	-	8 000	108 000	119 000	128 000
100 000	8 000	-	8 000	108 000	119 000	128 000
30 800	3 400	-	3 400	34 200	38 600	40 900
4 900	500	(400)	100	5 000	6 500	7 000
500	-	-	-	500	500	600
800	100	400	500	1 300	1 400	1 500
5 000	-	(3 000)	(3 000)	2 000	2 000	2 000
142 000	12 000	(3 000)	9 000	151 000	168 000	180 000

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
91 000	7 000	-	7 000	98 000	107 000	116 000
2 700	200	(200)	-	2 700	3 000	3 300
1 900	200	5 500	5 700	7 600	3 000	3 300
95 600	7 400	5 300	12 700	108 300	113 000	122 600
28 500	3 200	-	3 200	31 700	34 700	36 700
2 000	200	(200)	-	2 000	2 200	2 400
500	-	-	-	500	500	600
11 000	800	200	1 000	12 000	13 000	14 000
400	100	-	100	500	600	700
42 000	4 000	8 000	12 000	54 000	57 000	60 000
214 000	20 000	36 000	56 000	270 000	300 000	448 000
4 000	-	2 000	2 000	6 000	7 000	12 000
398 000	35 700	51 300	87 000	485 000	528 000	697 000

Costs of INIS activities

Table M.5

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	882 809
Consultants	-
Overtime	963
Temporary assistance	4 729
Sub-total	888 501
Common staff costs	315 369
Travel	7 735
Meetings	
Conferences, symposia, seminars	5 441
Technical committees, advisory groups	46 176
Representation and hospitality	682
Scientific and technical contracts	-
Common services, supplies and equipment	143 138
Other items of expenditure	2 260
Transfer of costs:	
Translation and records services	5 764
Printing and publishing services	585 504
Data processing services	748 033
Conference and contracts services	8 559
TOTAL	2 757 162

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 022 000	57 000	-	57 000	1 079 000	1 182 000	1 292 000
2 700	200	-	200	2 900	3 200	3 400
1 300	100	-	100	1 400	1 500	1 600
10 800	1 100	(500)	600	11 400	15 000	16 000
1 036 800	58 400	(500)	57 900	1 094 700	1 201 700	1 313 000
316 400	28 700	-	28 700	345 100	377 800	413 800
15 000	1 600	(3 000)	(1 400)	13 600	18 700	21 000
19 000	2 000	-	2 000	21 000	23 000	23 000
60 000	5 000	(15 000)	(10 000)	50 000	48 000	69 000
2 700	200	(200)	-	2 700	3 100	3 100
10 000	700	(700)	-	10 000	11 000	12 000
245 000	25 000	(70 000)	(45 000)	200 000	285 000	302 000
6 100	400	(600)	(200)	5 900	7 700	8 100
20 000	1 000	(9 000)	(8 000)	12 000	13 000	36 000
645 000	60 000	(80 000)	(20 000)	625 000	830 000	886 000
730 000	72 000	4 000	76 000	806 000	820 000	860 000
11 000	2 000	11 000	13 000	24 000	10 000	11 000
3 117 000	257 000	(164 000)	93 000	3 210 000	3 649 000	3 958 000

Costs of the library — Table M.6

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	316 994
Consultants	-
Overtime	354
Temporary assistance	8 038
Sub-total	325 386
Common staff costs	111 279
Travel	719
Common services, supplies and equipment	196 500
Other items of expenditure	152
Transfer of costs:	
Translation and records services	600
Printing and publishing services	46 705
Data processing services	77 999
TOTAL	759 340

Costs of data processing — Table M.7

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 224 435
Consultants	13 063
Overtime	3 346
Temporary assistance	28 952
Sub-total	1 269 796
Common staff costs	430 925
Travel	8 781
Scientific and technical contracts	58 964
Common services, supplies and equipment	2 402 709
Other items of expenditure	16 773
Transfer of costs:	
Translation and records services	600
Printing and publishing services	17 943
Data processing services	(4 206 491)
TOTAL	-

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
346 000	25 000	14 000	39 000	385 000	422 000	456 000
1 200	100	500	600	1 800	1 800	2 000
-	-	700	700	700	900	1 000
-	-	7 000	7 000	7 000	7 000	8 000
347 200	25 100	22 200	47 300	394 500	431 700	467 000
107 000	12 100	5 000	17 100	124 100	134 600	145 600
900	100	1 400	1 500	2 400	2 500	3 000
167 000	24 600	43 400	68 000	235 000	303 000	342 000
900	100	1 000	1 100	2 000	2 200	2 400
2 000	-	-	-	2 000	2 000	2 000
48 000	4 000	(7 000)	(3 000)	45 000	53 000	62 000
80 000	8 000	9 000	17 000	97 000	110 000	130 000
753 000	74 000	75 000	149 000	902 000	1 039 000	1 154 000

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 409 000	144 000	-	144 000	1 553 000	1 742 000	1 865 000
3 600	300	500	800	4 400	5 000	15 000
15 000	1 500	-	1 500	16 500	26 000	19 000
33 300	2 900	34 900	37 800	71 100	88 000	87 000
1 460 900	148 700	35 400	184 100	1 645 000	1 861 000	1 986 000
436 700	60 300	-	60 300	497 000	557 000	597 000
9 400	1 000	3 600	4 600	14 000	16 000	18 000
40 000	3 000	22 000	25 000	65 000	101 000	110 000
2 170 000	174 000	434 000	608 000	2 778 000	2 900 000	3 054 000
32 000	3 000	5 000	8 000	40 000	50 000	70 000
-	-	-	-	-	-	-
16 000	1 000	3 000	4 000	20 000	23 000	25 000
(4 165 000)	(391 000)	(503 000)	(894 000)	(5 059 000)	(5 508 000)	(5 860 000)
-	-	-	-	-	-	-

Computer services: Breakdown of costs by programme

Table M.8

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Allocated to other programmes:					
Technical assistance and co-operation	95 133	174 000	202 000	206 000	260 000
Nuclear power	260 168	98 000	320 000	345 000	375 000
Nuclear fuel cycle	55 669	55 000	70 000	80 000	90 000
Nuclear safety	62 438	43 000	109 000	132 000	163 000
Food and agriculture	12 886	30 000	34 000	37 000	40 000
Life sciences	6 761	7 000	20 000	20 000	20 000
Physical sciences	173 348	150 000	209 000	218 000	237 000
The Laboratory	44 870	33 000	36 000	56 000	60 000
Safeguards	1 805 090	2 028 000	2 221 000	2 277 000	2 292 000
Executive management and technical programme planning	29 220	7 000	7 000	8 000	10 000
Administration	609 659	589 000	710 000	910 000	1 015 000
General services	42 767	21 000	30 000	40 000	40 000
Service activities	176 710	116 000	182 000	242 000	256 000
Sub-total, allocated data processing services (see Table M.1)	3 374 719	3 351 000	4 150 000	4 571 000	4 858 000
Remaining as a charge to the programme Information and technical services:					
Scientific journals	5 740	4 000	6 000	7 000	12 000
INIS	748 033	730 000	806 000	820 000	860 000
Library	77 999	80 000	97 000	110 000	130 000
TOTAL	4 206 491	4 165 000	5 059 000	5 508 000	5 860 000

Summary of manpower by organization unit and category

Table M.9

Organization unit	1981 Adjusted budget			1982 Adjusted budget			1983 Estimate			1984 Preliminary estimate			1985 Preliminary estimate		
	P	GS	Total	P	GS	Total	P	GS	Total	P	GS	Total	P	GS	Total
Office of the Director	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Scientific journals	1	3	4	1	3	4	1	3	4	1	3	4	1	3	4
INIS	14	25	39	14	25	39	14	25	39	14	25	39	14	26	40
Library	4	10	14	4	10	14	4	11	15	4	11	15	4	11	15
Computer Services	20	40	60	20	41	61	38	23	61	38	25	63	38	26	64
TOTAL	40	80	120	40	81	121	58	64	122	58	66	124	58	68	126

SUB-PROGRAMME M.1

INIS

OBJECTIVE

M.1/1. The objective is to operate and further develop a comprehensive nuclear information and abstracting service involving the processing of input received from Member States, the provision of output in a variety of forms to Member States for dissemination on a national basis and the provision of assistance to Member States to help them in improving their methods of information handling and in gaining more rapid access to nuclear information sources.

PROGRAMME TRENDS FOR 1983-84

M.1/2. Although the volume of input to the INIS System from the Member States seems to be fairly stable, the demand for output services continues to increase. This is particularly true where information centres are becoming more sophisticated and are taking steps to obtain on-line access to the INIS data base. The trends foreseen are: increased participation in data base networks (i.e. co-operative links between information systems); additional training in on-line data base utilization; the further development of computerized, unified, multilingual versions of the official INIS thesaurus; and new experiments leading to procedures for direct transmission of input over networks to Vienna and direct distribution of the output data base to Member States. In response to a continuing need, it is planned to strengthen the assistance and services provided to Member States, particularly in their efforts to achieve full coverage of the literature, enhance their information infrastructure and establish national information services based on INIS.

RESULTS TO DATE

M.1/3. Sixty-six Member States and 14 international organizations are now participating in INIS, and their combined input exceeds 70 000 published items a year. At the end of 1981, the INIS bibliographic file had grown to over 640 000 items and the "library" of publications (reports, standards, patents, theses, etc.) available in microfiche form from the INIS Clearinghouse had risen to almost 160 000 documents. Cumulative indexes to the INIS bibliographic file are now made available to Member States not only as six-month but also as full-year summaries. The INIS Atomindex continues to be the announcement and abstract journal for the world's literature in nuclear science and technology.

M.1/4. The INIS data processing involves the use of the latest techniques, such as optical character recognition (OCR), computer-driven photocomposition and on-line data entry and correction. Recent system efforts aim to provide interested Member States, where it is technically feasible, with direct on-line access to the INIS data base and other searchable files stored on the Agency's computer; by the end of 1981, 33 Member States had such access.

M.1/5. The INIS centres in participating Member States are responsible for providing input to the system and arranging for the use of the products (INIS magnetic tapes, INIS Atomindex and INIS microfiches). Thus, the existence of INIS has induced countries to develop their own capabilities for collecting the national literature and disseminating information and to build up national information structures in accordance with local conditions and needs. To assist Member States in developing the specialized manpower required, INIS has conducted regular training seminars, made available opportunities for training at the Agency's Headquarters and provided a technical advisory service for national information centres. Over 500 people, many of them from developing countries, have undergone some form of INIS training since the system started. With the support of technical co-operation funds, Agency staff have helped to install at national centres the computer software necessary for local machine searches to be made on the INIS file.

M.1/6. The identification and classification of data (data flagging) within the documents indexed by INIS became a routine input procedure during 1980.

PLANS FOR 1983-84

M.1/7. The principal activity of INIS will be the maintenance of the bibliographic data base and the provision of output products to Member States every two weeks (Table M.10, Nos 1 and 2). It is expected that this activity will continue to grow slowly but steadily. More computer-derived services will be provided and the quantity of microfiche distribution will increase.

M.1/8. The availability of on-line access by Member States to the INIS data base will continue. Direct dial-up as well as existing connections through established networks will be supported and it is probable that other connections will be made (for example EURONET) as new networks become available or existing ones expand. It is expected that an increasing number of Member States, among them developing countries, will avail themselves of the on-line access facility.

M.1/9. Expansion of the INIS on-line output service to cover more Member States will necessitate supplemental training of personnel in Member States to achieve effective exploitation of the data base; following past experience, this will be provided through brief workshops organized in co-operation with individual Member States for the local training of specialists. A comprehensive INIS training seminar will be held in 1983 (Annex I(18)). The future programme will probably involve one such comprehensive seminar every other year, with two or more small workshops in the intervening years (Annex II(20)).

M.1/10. The development of a unified multilingual dictionary or thesaurus pertinent to the INIS scope will be completed, resulting in benefits for indexers and retrieval specialists in Member States - for example, the possibility of formulating searches in any one of the languages in the dictionary (Table M.10, No.3).

M.1/11. With a view to exploiting the speed of data transmission over telecommunication lines as well as overcoming the problems created by postal delays and transit damage, it is planned to explore the feasibility of direct transmission of input and output over telecommunication lines. Other recent technical developments, such as the use of mini-computers in conjunction with diskettes for data entry, will also be investigated. In some cases this might eliminate the need for OCR data conversion.

M.1/12. The Secretariat will monitor developments of common command languages for possible implementation in Vienna, thereby permitting users to search INIS and other data bases using a common set of commands.

M.1/13. The practice of regularly reviewing the scope, coverage and operating mechanisms of INIS will continue (Table M.10, No.4). An effort will be made to cover more fully the socio-economic aspects of the peaceful applications of nuclear power.

M.1/14. Training publications and aids will be prepared in order to meet the growing needs of Member States, especially developing countries (Table M.10, No.5). Particular efforts will be made through individual contacts to assist Member States to achieve full coverage of the nuclear literature and to start output services, thereby assisting in the improvement of the national information infrastructure. The fuller use of the INIS data base in Member States will be promoted through publications (Table M.10, No.6) and individual visits.

M.1/15. The documents in the INIS Reference Series, on which the system is based and which are frequently used as models for other systems and documentation activities, will continue to be updated and revised as necessary (Table M.10, Nos 7-13).

M.1/16. Modern COM (Computer Output on Microfiche) techniques will be used for producing some of the larger INIS publications such as the five-year cumulative index.

M.1/17. The INIS Secretariat will continue to co-operate with other sections of the Agency involved in the preparation and maintenance of other data bases, such as the Energy and Economic Data Bank.

M.1/18. Annual meetings of the INIS Liaison Officers will continue; these meetings are essential for INIS communications with Member States on policy and total system development (Table M.10, Nos 14 and 15). Future sessions will be held in a Member State in alternate years.

M.1/19. The report of the 1982 INIS Advisory Committee will be produced (Table M.10, No.16).

RELATED ACTIVITIES

M.1/20. As one of the leading world-wide information systems, INIS has been asked to give advice on and to participate in the formulation of international standards for information processing. Its obligations in this area will continue, particularly in the light of its increasing networking experience. A technical co-operation project was carried out in Venezuela during 1981. A training course for the Latin American region was held in Brazil in 1981.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

M.1/21. It is expected that developing countries will have a growing need for scientific and technical information and will place greater demands on systems providing information services. Developments in networking and computer techniques will facilitate the response of INIS to their requirements.

M.1/22. As information system networks become more widespread, INIS will exploit them to broaden the availability of its data base.

M.1/23. Technological improvements in computer and associated hardware will lead to greater information service capabilities at both the international and the national level. For example, mass storage devices will permit economical recording of the entire contents of documents. Improvements in facsimile transmission are also expected, so that requests for copies of documents could be met electronically rather than by slow reprographic techniques. More and more national information centres will be able to afford and operate small computer systems designed to provide information services tailored to the needs of users. This expansion of capabilities will undoubtedly increase the demand for INIS products.

CO-OPERATION WITH OTHER ORGANIZATIONS

M.1/24. In addition to the close co-operation required between the INIS Secretariat and INIS centres in Member States, significant co-operation will be maintained with: ESA, CEC and IIASA on networking; IOB, the ICSU Abstracting Board, UNESCO and EUSIDIC on directories and information processing concepts; ISO on information standards; and NEA and FAO on data base maintenance.

SUB-PROGRAMME M.2

Library

OBJECTIVE

M.2/1. The objective of the VIC Library, which is a common service under the direction of the Agency, is to provide the Secretariats of the organizations located at the Vienna International Centre with a full range of library services by acquiring, maintaining and disseminating a collection of

library materials covering the various aspects of the Secretariats' activities and by supplying them with reference and bibliographical information based on this collection and on appropriate external sources.

PROGRAMME TRENDS FOR 1983-84

M.2/2. There is a trend in libraries all over the world to rely more and more on the use of computers for various library services and for library administration. This trend is also apparent in the VIC Library, and in the future the Library will make increasing use of computerization for its systems management. This will facilitate additional use by Member States and forge closer links with the libraries of other international organizations. Increasing use of data bases in the libraries of other institutions will cause an expansion of the inter-library loan function.

M.2/3. Growing use of external commercial data bases will widen the range of information available to researchers at the VIC, and related document delivery systems will facilitate the acquisition of copies of the required articles and reports.

RESULTS TO DATE

M.2/4. The merger of the former Agency and UNIDO libraries was completed in 1980. Collections of works on social affairs and drug abuse were created in order to meet the needs of the United Nations units interested in these questions.

M.2/5. The Library's acquisition scope was expanded to cover current and retrospective documents in all fields of interest to the United Nations. As a first step, the Palais Palffy collection (which goes back to the earliest years of the United Nations) was integrated into the Library and a gift of 30 000 microfiches of United Nations documents was received from the Dag Hammarskjold Library in New York.

M.2/6. The film collection was expanded and agreement was reached with the UNIDO Public Information Section to house and loan its films. A programme of regular screenings for VIC staff was inaugurated.

M.2/7. Implementation of the UNESCO/ISIS software package was completed, permitting the better application of data processing technology in specialized library management. The order files were computerized and the Library's book catalogue was structured for on-line interrogation and retrieval. Design work on a computerized loan system and a system for the retrieval of official Agency documents was initiated.

PLANS FOR 1983-84

M.2/8. The Library will introduce the UNBIS (United Nations Bibliographic Information System) thesaurus, recently developed by the Dag Hammarskjold Library of the United Nations in New York. Supplemented by INIS and the IDA (UNIDO Industrial Developments Abstracts) system, the UNBIS thesaurus will be used to give more exact subject analysis of the VIC Library's collections.

M.2/9. The collection of technical reports will be expanded into the subject areas of UNIDO and the United Nations units.

M.2/10. The ISIS library management software package will be improved, in co-operation with UNESCO, to permit greater flexibility in the use of existing data bases.

M.2/11. There will be continual modification and improvement of the computerized system of library management to take advantage of new techniques as they are developed.

M.2/12. The training programme will be improved by the production of tape-slide shows covering the various library services and their use.

RELATED ACTIVITIES

M.2/13. A mission was organized to the Peruvian Atomic Energy Commission to advise on the establishment of a documentation centre for nuclear literature.

M.2/14. Courses geared to the interests of different groups within the VIC were offered to facilitate better use of library resources. Staff in-service training and fellowship training for librarians from Member States has continued.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

M.2/15. As the need for space becomes acute, parts of the journals collection will be replaced by microfiche. Greater use will be made of external data bases and rapid document delivery systems to replace costly journal subscriptions. The recording and claiming of individual journal issues will be computerized.

CO-OPERATION WITH OTHER ORGANIZATIONS

M.2/16. Co-operation with other international libraries, especially those of the United Nations system, will be strengthened, particularly in the exchange of computerized data, improvements in software and the loan of books and periodicals.

SUB-PROGRAMME M.3

Computer services

OBJECTIVE

M.3/1. The objective is to provide timely and effective data processing support to the Agency and to the various United Nations organizations at the Vienna International Centre. This includes systems analysis and design, programming, technical support and training for computer and word processor users, data entry services and special studies, the development and operation of efficient computer facilities capable of satisfying overall data processing requirements and the provision of effective co-ordination and technical support to all local computer processors located outside the main computer facility.

PROGRAMME TRENDS FOR 1983-84

M.3/2. There is a growing awareness among computer services users in the VIC that the introduction of management information systems can help them carry out their programmes more efficiently. This is causing a shift in emphasis from accounting-type systems to more management-oriented systems. As these new systems prove their worth, the trend will increase.

M.3/3. There has been a marked decrease in the unit cost of computing in recent years. This will continue during the present decade, resulting in the introduction of additional cost-effective applications. The trend of increasing computer usage is thus expected to continue, with growing emphasis on smaller computers located within Divisions but connected to the central complex.

M.3/4. The use of word processors for the preparation of documents within the Secretariat will continue to increase. There will also be a trend towards the connection of word processors to one another and to the central computer facility so as to permit the rapid storage, transmission and retrieval of information. It is expected that this will reduce the time spent on routine administration.

M.3/5. It is foreseen that more Member States will avail themselves, via communication links, of the data bases stored in the Agency's computers.

RESULTS TO DATE

M.3/6. The present central computer, an IBM 3032 purchased and installed in December 1978, became overloaded in 1981 and was augmented by a second central processing unit, a rented IBM 3033S, installed at the end of that year. The 3033S has about the same capacity as the 3032.

M.3/7. The Agency's computer system has progressed from the use of punched cards to a facility accessed predominantly by means of terminals.

M.3/8. In recent years, computer systems have been developed for the co-ordination of projects within the Division of Technical Co-operation (1981), for the follow-up of actions planned in the Agency's Programme (1981), for the establishment of a data base (EEDB) on the energy and economic aspects of nuclear power (1980) and for the direct access by Member States of the INIS data base by communication links (1980). A new safeguards computer system has been introduced (1981), the personnel computer system has been reorganized and the twelve-year-old payroll system is being replaced by one with lower maintenance costs.

M.3/9. The use of the data base management system has been expanded in order to reduce the amount of time spent by programmers and analysts on development and maintenance.

M.3/10. Word processors have been successfully introduced into the Secretariat and are providing benefits in the preparation of documents.

M.3/11. One of the central processing units in the computer facility was replaced by an IBM 3081 in 1982, thereby providing the necessary additional capacity at a better price/performance ratio.

PLANS FOR 1983-84

M.3/12. The computerized system for technical co-operation will be expanded in 1983 to include fellowships, training courses and UNDP projects.

M.3/13. An analysis will be made in 1983 to ascertain the feasibility of computerizing the preparation of the Agency's budget.

M.3/14. A file of data relating to posts and job descriptions will be established in 1984.

M.3/15. In conjunction with the Division of Languages, an analysis will be made in 1983 of the feasibility of using computer systems to assist in the translation of technical terms from one official language into another.

M.3/16. Efforts will be made to provide direct access by Member States to the computer system containing the operating experience data for all commercial nuclear power stations.

M.3/17. A computer system holding data on world-wide shipments of nuclear material will be introduced in 1983 and will be extended in 1984 to record accidents during transport.

M.3/18. A study on the feasibility of electronic mail and filing systems will be carried out in 1983 and, depending on the results, a pilot project may be established to determine whether these systems can effect administrative cost savings.

M.3/19. By 1984, the Agency computer system will be connected to major European and world-wide telecommunications networks, which will permit remote access from various places in the world.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

M.3/20. It is expected that the concept of the "automated office" will be realized in the Agency during this period, thereby making many administrative practices more efficient and cost-effective.

M.3/21. It is also expected that the applications of computer systems will continue to increase, though utilization of the central facility is not expected to show the rapid expansion of recent years. This is because there will be a trend toward the use of small computers connected to the central facility but located at different points throughout the Agency.

CO-OPERATION WITH OTHER ORGANIZATIONS

M.3/22. The Agency provides computer services to other organizations in the VIC on a cost-reimbursable basis. Approximately 25% of the total computer time is used by UNIDO, UNRWA, FAO (for the AGRIS System), the United Nations Postal Administration and the other United Nations units. These services are expected to continue at the present level.

SUB-PROGRAMME M.4

Scientific journals

OBJECTIVE

M.4/1. The objective is to present and disseminate international scientific information on controlled thermonuclear fusion and fusion reactor technology through publication of "Nuclear Fusion" and its triennial supplement "World Survey of Major Activities in Controlled Fusion Research"; and to report on the Agency programmes in plasma physics and engineering and fusion reactor technology and on relevant aspects of nuclear and atomic physics, chemistry and the environment related to the practical utilization of fusion power.

PROGRAMME TRENDS FOR 1983-84

M.4/2. There is a growing involvement by Member States, including developing countries, in fusion research and continuing progress is being made in the fusion programme world-wide. In line with this evolution, "Nuclear Fusion" will carry articles on a broader range of fusion-related topics.

RESULTS TO DATE

M.4/3. The interest of the fusion community in "Nuclear Fusion" has steadily increased, especially since 1978 when it became a monthly instead of a bi-monthly publication. Scientists from more than 100 laboratories in about 25 Member States actively participate as authors and/or referees.

M.4/4. Compilation of the fourth, expanded, edition of the "World Survey of Major Activities in Controlled Fusion Research" has been completed in draft for publication in 1982; more than 200 laboratories in 31 Member States, including 11 developing countries, have contributed to this new edition.

M.4/5. A preliminary version of an updated subject classification scheme for "Nuclear Fusion" has been developed, with increased attention to subjects relating to practical power plant design. The final version, which will serve as a basis for a fusion thesaurus, is to be produced in co-operation with plasma physics institutes in Member States.

M.4/6. A Cumulative Index for all regular and special issues and supplements of "Atomic Energy Review", which was discontinued in 1981, has been prepared and published.

PLANS FOR 1983-84

M.4/7. "Nuclear Fusion" will continue to be published regularly (Table M.10, No.17) and will be somewhat expanded to accommodate the increase in activity in the field.

M.4/8. In consultation with Member States, updated versions of the subject classification scheme and the fusion thesaurus will be prepared and published as needed.

M.4/9. Work will be started on the fifth edition of the triennial "World Survey of Major Activities in Controlled Fusion Research" for publication in 1985 (Table M.10, No.18).

CO-OPERATION WITH OTHER ORGANIZATIONS

M.4/10. Close co-operation is maintained with the IFRC, major plasma physics laboratories (in particular Oak Ridge National Laboratory and Princeton University Plasma Physics Laboratory) and the plasma physics documentation centres at Garching (Federal Republic of Germany) and Culham (United Kingdom).

SUMMARY OF DOCUMENTS RESULTING FROM THE PROGRAMME

Table M.10

No.	Document	Users	Source	Year of issue	Paragraph
1.	INIS Data Base	All INIS Member States	All INIS Member States	Updated semi-monthly	M.1/7
2.	INIS Atomindex	As above	As above	As above	M.1/7
3.	INIS Multilingual Dictionary	As above	INIS Secretariat: INIS Centres using French, German, Russian or Spanish	1983	M.1/10
4.	Report on INIS input/output procedures	As above	TC 83/1 and 84/1	1983 1984	M.1/13
5.	INIS input training aids	As above	INIS Secretariat	1983	M.1/14
6.	INIS Today (English)	As above	As above	1983	M.1/14
7.	IAEA-INIS-4, Instructions for Submitting Abstracts	As above	INIS Secretariat and Member States	1983	M.1/15
8.	IAEA-INIS-6, Authority List for Corporate Entries and Report Number Prefixes	As above	As above	1983	M.1/15
9.	IAEA-INIS-11, Authority List for Journal Titles	As above	As above	1983	M.1/15
10.	IAEA-INIS-12, Manual for Indexing	As above	As above	1983	M.1/15
11.	IAEA-INIS-13, Thesaurus	As above	As above	1983	M.1/15
12.	IAEA-INIS-14, Description of Computer Programs	As above	As above	1983	M.1/15
13.	INIS Reference Series (Titles to be updated in 1984 not yet decided)	As above	As above	1984	M.1/15
14.	Report of 11th Meeting of INIS Liaison Officers	As above	INIS Liaison Officers' meeting 83/2	1983	M.1/18
15.	Report of 12th Meeting of INIS Liaison Officers	As above	INIS Liaison Officers' meeting 84/2	1984	M.1/18
16.	Report on achievements and future orientation of INIS	As above	(Meeting in 1982)	1983	M.1/19
17.	Nuclear Fusion	International fusion community; Secretariat	Laboratories in Member States	Monthly	M.4/7
18.	World Survey of Major Activities in Controlled Fusion Research	As above	As above	1985	M.4/9

TECHNICAL COMMITTEES AND ADVISORY GROUPS IN 1983-84

Within the limits of the appropriation and subject to the requirements of the programme as outlined for 1983-84, it is planned to hold the meetings listed below. The reference following each meeting is to the relevant paragraph in the programme.

1983	Paragraph
1. Technical Committee on INIS input/output procedures	M.1/13
2. Eleventh consultative meeting of INIS Liaison Officers	M.1/18

1984	
1. Technical Committee on INIS input/output procedures	M.1/13
2. Twelfth consultative meeting of INIS Liaison Officers	M.1/18

N. POLICY-MAKING ORGANS

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table N.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	171 973
Overtime	47 632
Temporary assistance	13 050
Sub-total	232 655
Common staff costs	61 435
Travel	1 041
Meetings	
Interpretation for sessions	265 518
Representation and hospitality	-
Common services, supplies and equipment	39 287
Other items of expenditure	61 930
Transfer of costs:	
Translation and records services	1 507 736
Printing and publishing services	408 509
Conference and contracts services	159 761
TOTAL	2 737 872

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
188 000	11 000	-	11 000	199 000	218 000	235 000
15 400	1 200	400	1 600	17 000	18 400	19 900
18 300	900	(8 000)	(7 100)	11 200	12 100	13 200
221 700	13 100	(7 600)	5 500	227 200	248 500	268 100
58 400	5 400	-	5 400	63 800	69 700	74 800
-	-	1 300	1 300	1 300	1 400	1 500
178 000	15 000	187 000	202 000	380 000	408 000	437 000
-	-	6 000	6 000	6 000	6 000	7 000
103 200	6 200	(43 700)	(37 500)	65 700	72 400	79 600
68 700	6 300	-	6 300	75 000	78 000	84 000
1 452 000	142 000	168 000	310 000	1 762 000	2 023 000	2 046 000
505 000	44 000	(82 000)	(38 000)	467 000	592 000	630 000
107 000	12 000	51 000	63 000	170 000	185 000	200 000
2 694 000	244 000	280 000	524 000	3 218 000	3 684 000	3 828 000

SUMMARY OF MANPOWER

Table N.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	1	1	1	-	1	1	1
P-2	1	1	1	-	1	1	1
Sub-total	3	3	3	-	3	3	3
GS	2	2	2	-	2	2	2
TOTAL	5	5	5	-	5	5	5

Distribution of costs between the General Conference and the Board

Table N.3

Organ	1981 Actual obligations
General Conference	939 452
Board of Governors	1 798 420
TOTAL	2 737 872

CHANGES IN COSTS

N/1. As will be seen from Table N.1 above, the cost of this programme is expected to increase by $524 000, of which $244 000 is required to cover salary and other price increases and $280 000 is a programme increase.

N/2. Programme increases are foreseen in respect of overtime ($400) and travel ($1300) and hospitality ($6000). Programme decreases of $8000 under "Temporary assistance" and $43 700 under "Common services, supplies and equipment" will be possible.

N/3. As a result of additional meetings of the Board of Governors and its committees, programme increases in interpretation ($187 000), in translation and records services ($168 000) and in conference services ($51 000) are foreseen. For printing and publishing services, a programme decrease of $82 000 is foreseen.

THE PROGRAMME

N/4. The responsibility for providing the services required by the Policy-making Organs of the Agency, namely the General Conference and the Board of Governors, is shared by the Secretariat of the Policy-making Organs, which undertakes the organizational and administrative work involved, and three Divisions in the Agency's Secretariat. The Division of Languages translates documents and prepares records of proceedings; the Division of Publications reproduces and circulates the documents; and the Division of External Relations provides the conference and interpretation facilities and services needed for the meetings of the two organs and their committees. In all work concerning the General Conference and the Board of Governors, the Secretariat of the Policy-making Organs reports to the Director General. Certain matters related to internal administration are co-ordinated with the Head of the Department of Administration.

N/5. It is planned to provide these services throughout the period 1983-88 on the same lines as in the past, introducing such improvements as prove to be desirable in the light of further experience and the changing requirements of the Policy-making Organs themselves.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 105 000	101 800	(144 800)	(43 000)	1 062 000	1 235 000	1 295 000
1 589 000	142 200	424 800	567 000	2 156 000	2 449 000	2 533 000
2 694 000	244 000	280 000	524 000	3 218 000	3 684 000	3 828 000

O. EXECUTIVE MANAGEMENT AND TECHNICAL PROGRAMME PLANNING

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table 0.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	824 234
Consultants	83 652
Overtime	8 760
Temporary assistance	1 278
Sub-total	917 924
Common staff costs	294 441
Travel	69 760
Meetings	
Technical committees advisory groups	38 179
Representation and hospitality	24 493
Common services, supplies and equipment	4 066
Transfer of costs:	
Translation and records services	41 003
Printing and publishing services	8 459
Data processing services	29 220
Conference and contracts services	1 426
TOTAL	1 428 971

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 010 000	58 000	-	58 000	1 068 000	1 202 000	1 315 000
99 200	7 200	53 600	60 800	160 000	167 900	176 300
12 000	900	(100)	800	12 800	13 600	14 300
1 700	100	10 400	10 500	12 200	13 000	13 800
1 122 900	66 200	63 900	130 100	1 253 000	1 396 500	1 519 400
313 300	29 000	-	29 000	342 300	385 500	420 700
86 500	9 500	14 400	23 900	110 400	119 500	126 500
38 000	4 000	-	4 000	42 000	46 000	50 000
27 000	500	(3 000)	(2 500)	24 500	26 000	26 000
9 300	800	(300)	500	9 800	10 500	11 400
42 000	2 000	(5 000)	(3 000)	39 000	41 000	43 000
16 000	1 000	1 000	2 000	18 000	18 000	19 000
7 000	-	-	-	7 000	8 000	10 000
(139 000)	(12 000)	-	(12 000)	(151 000)	(163 000)	(176 000)
1 523 000	101 000	71 000	172 000	1 695 000	1 888 000	2 050 000

SUMMARY OF MANPOWER

Table O.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
DG	1	1	1	-	1	1	1
DDG	3	3	3	-	3	3	3
D	1	1	1	-	1	1	1
P-5	1	1	1	-	1	2	2
P-4	2	1	2	-	2	2	2
P-3	1	1	1	-	1	1	1
P-2	3	3	3	-	3	3	3
P-1	1	1	1	-	1	1	1
Sub-total	13	12	13	-	13	14	14
GS	11	11	15	-	15	15	15
TOTAL	24	23	28	-	28	29	29

CHANGES IN COSTS AND MANPOWER

Costs

O/1. As will be seen from Table O.1 above, it is expected that the cost of this programme will increase by $172 000 as a result of salary and other price increases of $101 000 and a programme increase of $71 000.

O/2. The programme increase of $53 600 in respect of consultants' services is required for a special assistant for the Director General. Programme increases in respect of temporary assistance ($10 400) and travel ($14 400) will also be required for the Office of the Director General. A programme decrease of $3000 is foreseen in respect of hospitality.

O/3. As regards the allocation of service costs, a programme decrease is foreseen in linguistic services ($5000), while there will be programme increases in respect of printing and publishing services ($1000).

Manpower

O/4. As will be seen from Table O.2 above, one P-4 post and four GS posts (representing the Contracts Administration Section) are being transferred to this programme in the adjusted manning table for 1982. As explained in the Introduction, the cost of administering research contracts is being allocated to the programmes which use those services.

O/5. No change in the manning table is foreseen for 1983.

O/6. For 1984, one P-5 post will be required for the office of the Deputy Director General for Research and Isotopes, for a co-ordinator of RCA projects.

THE PROGRAMME

OBJECTIVE

O/7. The objective of the Office of the Director General is to propose and implement programmes within the scope of the Agency's statutory objectives, pursuant to decisions of the Board and the General Conference and on the advice of the Scientific Advisory Committee; it is also responsible for the efficient conduct and co-ordination of the Agency's work.

O/8. The objective of the Offices of the Deputy Directors General for Research and Isotopes, for Technical Co-operation and for Nuclear Energy and Safety is to advise and assist the Director General in matters concerning the planning and implementation of the Agency's scientific programmes; they are also responsible for the effective execution of approved programmes within their respective Departments.

P. ADMINISTRATION

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table P.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	4 478 443
Consultants	94 955
Overtime	18 869
Temporary assistance	120 947
Sub-total	4 713 214
Common staff costs	1 599 155
Travel	54 194
Meetings	
Conferences, symposia, seminars	-
Technical committees advisory groups	4 310
Representation and hospitality	14 628
Scientific and technical contracts	-
Common services, supplies and equipment	120 804
Other items of expenditure	2 033
Transfer of costs:	
Translation and records services	340 254
Printing and publishing services	597 004
Data processing services	609 659
To other: PNE	(46 000)
Safeguards	(150 000)
Conference and contracts services	(455 034)
TOTAL	7 404 221

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
5 061 000	349 000	36 000	385 000	5 446 000	6 100 000	6 630 000
13 300	1 000	20 700	21 700	35 000	57 000	62 000
14 000	1 100	7 900	9 000	23 000	31 200	33 400
64 800	4 800	(51 900)	(47 100)	17 700	89 000	77 500
5 153 100	355 900	12 700	368 600	5 521 700	6 277 200	6 802 900
1 569 000	162 300	12 000	174 300	1 743 300	1 952 600	2 121 800
67 600	6 900	(5 500)	1 400	69 000	81 700	91 700
-	-	31 000	31 000	31 000	70 000	45 000
33 000	3 000	(36 000)	(33 000)	-	16 000	-
18 800	1 100	(2 000)	(900)	17 900	25 100	25 300
-	-	-	-	-	100 000	100 000
118 200	11 900	21 400	33 300	151 500	209 700	230 100
5 300	500	302 800	303 300	308 600	308 700	309 200
459 000	37 000	(78 000)	(41 000)	418 000	456 000	488 000
523 000	45 000	(19 000)	26 000	549 000	603 000	647 000
589 000	57 000	64 000	121 000	710 000	910 000	1 015 000
-	-	-	-	-	-	-
(165 000)	(6 000)	-	(6 000)	(171 000)	(184 000)	(198 000)
(427 000)	(43 000)	24 000	(19 000)	(446 000)	(514 000)	(556 000)
7 944 000	631 600	327 400	959 000	8 903 000	10 312 000	11 122 000

SUMMARY OF MANPOWER

Table P.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
DDG	1	1	1	-	1	1	1
D	6	6	6	-	6	6	6
P-5	15	15	15	1	16	16	16
P-4	17	17	16	-	16	16	16
P-3	15	15	14	-	14	15	15
P-2	9	9	9	(1)	8	8	8
P-1	2	1	1	-	1	1	1
Sub-total	65	64	62	-	62	63	63
GS	119	119	116	5	121	124	126
M&O	3	3	3	-	3	3	3
TOTAL	187	186	181	5	186	190	192

CHANGES IN COSTS AND MANPOWER

Costs

P/1. As will be seen from Table P.1 above, it is expected that the cost of this programme will increase by $959 000, of which $631 600 will be required to cover salary and other price increases and $327 400 will be a programme increase.

P/2. The programme increase of $48 000 in respect of salaries for established posts and common staff costs is the net result of the addition and deletion of a number of Professional and General Service posts as described below under "Manpower". Programme increases are foreseen in respect of consultants' services ($20 700 under "Public Information" for "public acceptance" projects), overtime ($7900, mainly for "Budget and Finance") and common services, supplies and equipment ($21 400, mainly for "External Relations", "Public Information" and "Medical Services").

P/3. The programme increase of $31 000 in respect of a seminar and the co-sponsorship of a symposium under "Legal Services" is offset by a programme decrease of $36 000 in respect of Technical Committees and Advisory Groups. A programme decrease of $2000 in respect of hospitality is foreseen.

P/4. Under "Other items of expenditure", there is a programme increase of $302 800: of this, $2800 is for training of staff in "Internal Audit" and "Personnel Services", and $300 000 is provided for a training programme for young scientists from developing countries (see para. P.6/2(f)). The funds are included in "Personnel Services".

P/5. In line with the presentation in the 1982 budget document, the cost estimates for the International Plutonium Storage study are included under the "Safeguards" programme.

P/6. As regards the allocation of service costs, programme increases foreseen in respect of data processing services ($64 000) and conference and contracts services ($24 000) are offset by programme decreases in respect of linguistic services ($78 000) and printing and publishing services ($19 000).

Manpower

P/7. As will be seen from Table P.2 above, several changes are made in the adjusted manning table for 1982. One P-4 post and four GS posts belonging to the Contracts Administration Section are transferred to the Office of the Deputy Director General for Research and Isotopes (the Department which has to administer most of the research contract funds). One P-3 post is transferred from the Division of Budget and Finance to the Division of Publications, where it will be used to accommodate the upgrading of posts in accordance with a detailed manpower study. The GS post which will be available as a consequence of the upgradings in the Division of Publications is transferred to the Division of Budget and Finance, where additional posts are required in 1983. Details are provided in Annex IV.

P/8. For 1983, the addition of one P-4 post and one GS post is required for "Public Information". One P-2 post is released from "Budget and Finance", but the addition of two further GS posts is required. One GS each is also needed for "Personnel Services" and for "Medical Services". As a result of a survey, one P-4 post in "Personnel Services" will require upgrading to the P-5 level. Detailed justifications are provided in Annex IV.

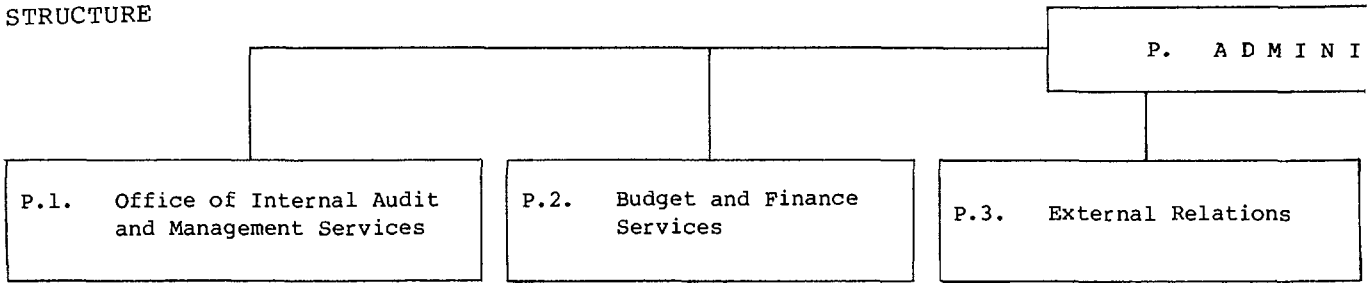
P/9. For 1984, the addition of one P-3 post and two GS posts for "Budget and Finance" and of one GS post for "Personnel Services" is foreseen. For 1985, one further GS post each will be needed for "Budget and Finance" and "Personnel Services".

THE PROGRAMME

OBJECTIVE

P/10. The objective is to ensure the effective functioning of the Agency's administrative activities. The Office of the Deputy Director General for Administration is responsible for the overall direction and supervision of the internal audit and management, budget and finance, personnel, legal and external relations services, in addition to the linguistic services and the "General Services" programme. Certain matters related to internal administration in respect of the Secretariat of the Policy-making Organs will be co-ordinated with the Department of Administration.

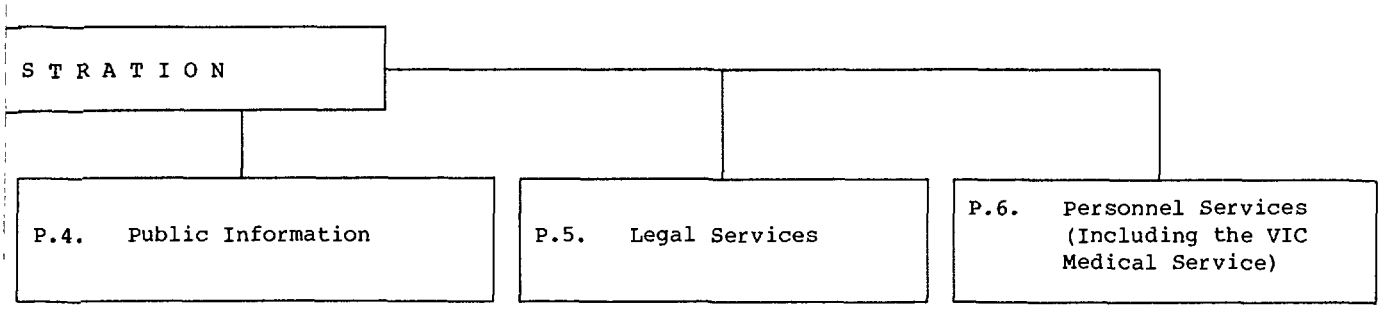
STRUCTURE



Summary of manpower by organization unit and category

Table P.3

Organization unit	1981 Adjusted budget				1982 Adjusted budget			
	P	GS	M&O	Total	P	GS	M&O	Total
Office of the Deputy Director General for Administration	3	2	-	5	3	2	-	5
Office of Internal Audit and Management Services	5	5	-	10	5	5	-	10
Division of Budget and Finance	22	47	-	69	19	44	-	63
Division of External Relations	13	20	-	33	13	20	-	33
Division of Public Information	4	7	-	11	4	7	-	11
Legal Division	7	4	-	11	7	4	-	11
Division of Personnel								
Personnel services	8	22	-	30	8	22	-	30
Medical services	3	12	3	18	3	12	3	18
TOTAL	65	119	3	187	62	116	3	181



1983 Estimate				1984 Preliminary estimate				1985 Preliminary estimate			
P	GS	M&O	Total	P	GS	M&O	Total	P	GS	M&O	Total
3	2	-	5	3	2	-	5	3	2	-	5
5	5	-	10	5	5	-	10	5	5	-	10
18	46	-	64	19	48	-	67	19	49	-	68
13	20	-	33	13	20	-	33	13	20	-	33
5	8	-	13	5	8	-	13	5	8	-	13
7	4	-	11	7	4	-	11	7	4	-	11
8	23	-	31	8	24	-	32	8	25	-	33
3	13	3	19	3	13	3	19	3	13	3	19
62	121	3	186	63	124	3	190	63	126	3	192

Costs of the Office of the Deputy Director General for Administration

Table P.4

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	185 746
Overtime	479
Sub-total	186 225
Common staff costs	66 356
Travel	8 186
Representation and hospitality	6 606
Common services, supplies and equipment	1 912
Transfer of costs:	
Translation and records services	2 227
Printing and publishing services	4 176
TOTAL	275 688

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
225 000	8 000	-	8 000	233 000	253 000	273 000
400	-	100	100	500	600	700
225 400	8 000	100	8 100	233 500	253 600	273 700
69 900	4 400	-	4 400	74 300	81 400	87 300
13 100	1 400	(500)	900	14 000	15 500	17 000
7 300	200	(1 000)	(800)	6 500	7 500	8 000
3 300	400	1 000	1 400	4 700	5 000	6 000
2 000	-	-	-	2 000	3 000	3 000
11 000	1 000	(1 000)	-	11 000	12 000	13 000
332 000	15 400	(1 400)	14 000	346 000	378 000	408 000

SUB-PROGRAMME P.1

Office of internal audit and management services

OBJECTIVE

P.1/1. The objective is to carry out an independent appraisal activity in order to assist the Director General in achieving effectiveness of procedures and operations with a view to ensuring the economical and efficient use of the Agency's resources by:

(a) Reviewing financial and administrative procedures and operations covering all funds and resources administered by the Agency;

(b) Providing a management advisory service to all Departments;

(c) Co-ordinating evaluation activities within the Agency and performing related tasks; and

(d) Compiling, issuing and updating the Agency's Administrative Manual and other administrative instructions.

Costs of internal audit and management services

Table P.5

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	270 176
Overtime	103
Temporary assistance	16 892
Sub-total	287 171
Common staff costs	96 516
Travel	2 407
Representation and hospitality	-
Common services, supplies and equipment	46
Other items of expenditure	-
Transfer of costs:	
Translation and records services	-
Printing and publishing services	28 748
Data processing services	2 575
TOTAL	417 463

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
307 000	26 000	-	26 000	333 000	365 000	394 000
-	-	-	-	-	-	-
-	-	-	-	-	-	-
307 000	26 000	-	26 000	333 000	365 000	394 000
95 500	11 500	-	11 500	107 000	116 500	126 600
2 300	300	1 100	1 400	3 700	4 200	4 100
100	-	-	-	100	100	100
100	-	100	100	200	200	200
-	-	2 000	2 000	2 000	1 000	1 000
10 000	1 000	-	1 000	11 000	11 000	12 000
25 000	2 000	(1 000)	1 000	26 000	27 000	29 000
18 000	2 000	(3 000)	(1 000)	17 000	26 000	26 000
458 000	42 800	(800)	42 000	500 000	551 000	593 000

SUB-PROGRAMME P.2

Budget and finance services

OBJECTIVE

P.2/1. The objective is to develop and implement programme, budgetary and financial procedures to ensure effective financial control and the attainment of programme objectives with the most economical use of available financial resources.

PLANS FOR 1983-88

P.2/2. The Division of Budget and Finance will:

(a) Maintain the financial records of the Regular Budget, Technical Co-operation Fund and extrabudgetary funds, prepare the Agency's accounts thereof and provide the data required for the effective financial management of the Agency;

(b) Be responsible for programme budgeting, ensuring effective use of resources and facilitating planning and control of activities;

(c) Carry out the necessary work relating to Member States' contributions to the Regular Budget and other funds;

Costs of budget and finance services

Table P.6

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 416 283
Consultants	26 627
Overtime	16 899
Temporary assistance	47 867
Sub-total	1 507 676
Common staff costs	505 944
Travel	6 209
Representation and hospitality	353
Scientific and technical contracts	-
Common services, supplies and equipment	11 202
Transfer of costs:	
Translation and records services	28 296
Printing and publishing services	46 059
Data processing services	426 632
TOTAL	2 532 371

(d) Be responsible for establishing financial and budgetary systems, for documenting them and for issuing related regulations and instructions to the Agency's organizational units and staff members, as appropriate;

(e) Be responsible for the financial arrangements in respect of common services established at the VIC;

(f) Provide for or co-ordinate the Agency's representation at meetings of the United Nations or other international bodies on financial and budgetary matters;

(g) Review and co-ordinate proposals for duty travel of staff; and

(h) Be responsible for the control of expenditures and receipts in connection with all funds administered by the Agency.

P.2/3. The Division of Budget and Finance plans to carry out in this period the following actions in order to strengthen its present system of financial management:

(a) Make a comprehensive and detailed study of the present accounting and budget system to provide a basis for further improvement, as necessary, in the integrity of the overall computerized system;

(b) Implement improved cost measurement systems for VIC common services; and continue with the implementation of an improved payroll system.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 699 000	105 000	(47 000)	58 000	1 757 000	2 085 000	2 279 000
-	-	-	-	-	-	-
9 900	800	7 300	8 100	18 000	19 000	20 000
34 600	2 800	(45 400)	(42 600)	(8 000)	33 000	18 000
1 743 500	108 600	(85 100)	23 500	1 767 000	2 137 000	2 317 000
526 800	50 800	(15 000)	35 800	562 600	667 600	729 600
8 200	900	(100)	800	9 000	10 000	11 000
200	-	200	200	400	400	400
-	-	-	-	-	100 000	100 000
13 300	1 300	(10 600)	(9 300)	4 000	14 000	15 000
24 000	2 000	(1 000)	1 000	25 000	27 000	29 000
25 000	2 000	15 000	17 000	42 000	42 000	45 000
407 000	40 000	(7 000)	33 000	440 000	532 000	567 000
2 748 000	205 600	(103 600)	102 000	2 850 000	3 530 000	3 814 000

SUB-PROGRAMME P.3

External relations

OBJECTIVE

P.3/1. The objectives are:

(a) To assist the Director General in the Agency's relations with Member States and with other international organizations;

(b) To direct the negotiation of safeguards agreements, to promote the negotiation, signature and entry into force of safeguards agreements and to participate in Agency studies related to non-proliferation, safeguards and nuclear supplies; and

(c) To provide organizational and administrative services for scientific meetings at Headquarters and other locations and to co-ordinate and provide administrative services for all other Agency meetings (the General Conference, the Board of Governors and its committees, etc.).

PLANS FOR 1983-88

P.3/2. Advice will be given to the Director General and the Departments in the Secretariat on relations with Governments and with other organizations.

Costs of external relations

Table P.7

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	984 570
Consultants	32 027
Overtime	1 388
Temporary assistance	7 588
Sub-total	1 025 573
Common staff costs	351 723
Travel	15 472
Representation and hospitality	2 332
Common services, supplies and equipment	13 878
Transfer of costs:	
Translation and records services	21 091
Printing and publishing services	88 260
Data processing services	20 957
Conference services	(455 034)
TOTAL	1 084 252

P.3/3. In co-operation with the Legal Division and the Department of Safeguards, the Division of External Relations will negotiate agreements for the application of safeguards and will continue its participation in studies related to non-proliferation, safeguards and nuclear supplies.

P.3/4. The Division of External Relations will compile reports for the General Conference and prepare documents for the Board and the General Conference on matters affecting the external relations of the Agency. It will also oversee and maintain the Agency's relations with the United Nations and other international bodies. It will provide protocol services to the Secretariat and to Missions and Delegations, and visa services to the Secretariat.

P.3/5. Through its offices at United Nations Headquarters in New York and in Geneva, permanent representation and liaison will be maintained with the United Nations and with the United Nations system of organizations.

P.3/6. The necessary services will be provided for the Agency's meetings both in Vienna and at other locations in Member States. The total number of meetings now being serviced annually is around 200.

P.3/7. The Agency will continue sponsorship of non-Agency meetings which are of interest to the Agency's programme by providing scientific as well as administrative and organizational support. In all of these cases the Agency distributes the information concerning the meetings to all its Member States.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 057 000	66 000	-	66 000	1 123 000	1 197 000	1 297 000
-	-	-	-	-	-	-
1 700	100	200	300	2 000	7 500	8 000
11 700	900	(12 600)	(11 700)	-	25 000	26 000
1 070 400	67 000	(12 400)	54 600	1 125 000	1 229 500	1 331 000
327 400	32 400	-	32 400	359 800	382 700	414 700
18 700	2 000	(5 700)	(3 700)	15 000	19 000	20 000
5 000	400	(2 400)	(2 000)	3 000	5 000	5 000
2 500	300	13 400	13 700	16 200	18 800	21 300
33 000	3 000	-	3 000	36 000	45 000	48 000
37 000	3 000	-	3 000	40 000	73 000	78 000
35 000	3 000	(4 000)	(1 000)	34 000	35 000	48 000
(430 000)	(43 000)	-	(43 000)	(473 000)	(515 000)	(557 000)
1 099 000	68 100	(11 100)	57 000	1 156 000	1 293 000	1 409 000

SUB-PROGRAMME P.4
Public information

OBJECTIVE

P.4/1. The objective is to keep Member States and the public informed of the Agency's activities and of all related aspects of the peaceful uses of nuclear energy through newspapers, conferences, periodicals, radio, television and exhibitions.

PLANS FOR 1983-88

P.4/2. The Division of Public Information will provide general information to Member States and the public and also to interested groups on the programmes and activities of the Agency. Major vehicles for this information will be the press, radio and television. The press releases on Agency scientific meetings will be presented to the media more frequently and will be written in a style more easily understandable by the layman. Experts attending the meetings will be asked to a greater extent to give interviews with journalists to explain the situation in Member States in the different areas of the Agency's activities. It is planned to set up the necessary structure to provide immediate information through press briefings or written features about incidents in the nuclear field. Press briefings will continue to be held at major Agency events.

P.4/3. The Division will continue to publish brochures and leaflets in various languages concerning topical problems, their solution, past experience and future fields of research. It will also publish the International Atomic Energy Agency Bulletin, which reviews the Agency's programmes and various aspects of the peaceful uses of nuclear energy. In addition, it is planned to give wider distribution to speeches on the Agency's work which have been given at Agency meetings and other special events by representatives of Member

Costs of public information Table P.8

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	313 612
Consultants	18 185
Overtime	-
Temporary assistance	5 889
Sub-total	337 686
Common staff costs	112 032
Travel	5 012
Meetings	
Technical committees, advisory groups	435
Representation and hospitality	3 752
Common services, supplies and equipment	38 122
Transfer of costs:	
Translation and records services	226 328
Printing and publishing services	290 370
Data processing services	13 540
To other: PNE	(23 000)
TOTAL	1 004 277

States, scientists and staff members. In the light of the growing interest of the public in nuclear power and energy questions, the Division will intensify its efforts to provide objective factual information. There will be increased co-operation with other United Nations organizations, especially FAO, WHO and UNEP, in joint public information publications.

P.4/4. The VIC is increasingly attracting visitors from all over the world. The service run by UNIDO now deals with approximately 50 000 visitors per year. The Division will, as in the past, provide lecturers and participate in the presentation of the international activities at the VIC. Exhibits in the VIC and at major conferences will be arranged as in the past. Exhibits are also foreseen for such events as, for example, the United Nations Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy, as well as United Nations General Assembly Sessions on Disarmament.

P.4/5. The importance of the public acceptance of nuclear power has increasingly influenced the work of the Division in its aim to provide objective factual information, including that connected with safety-related accidents. A system has been set up to enable rapid communication to be established with the relevant governmental and non-governmental organizations in Member States who would be concerned with nuclear safety-related incidents. Trends in the nuclear controversy will continue to be monitored and the advice of consultants will be sought on the areas to which special attention should be given. It is planned to computerize published reports on the nuclear controversy to provide easier retrieval. Similar computerized systems have already been set up for the Daily Press Review and the CAS documentation.

P.4/6. Attention will continue to be given to non-proliferation and related questions and efforts will be made to inform the public on the aims and capabilities of the Agency's safeguards system.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
329 000	25 000	49 000	74 000	403 000	451 000	483 000
13 300	1 000	20 700	21 700	35 000	50 000	55 000
900	100	-	100	1 000	2 500	3 000
1 100	100	(1 200)	(1 100)	-	2 300	2 500
344 300	26 200	68 500	94 700	439 000	505 800	543 500
101 500	11 500	16 000	27 500	129 000	144 200	154 500
8 400	1 000	4 600	5 600	14 000	20 000	25 000
-	-	-	-	-	-	-
2 900	200	900	1 100	4 000	7 000	8 000
49 900	5 100	5 000	10 100	60 000	105 000	115 000
234 000	23 000	3 000	26 000	260 000	280 000	300 000
345 000	30 000	(70 000)	(40 000)	305 000	347 000	380 000
13 000	1 000	-	1 000	14 000	27 000	30 000
-	-	-	-	-	-	-
1 099 000	98 000	28 000	126 000	1 225 000	1 436 000	1 556 000

SUB-PROGRAMME P.5

Legal services

OBJECTIVE

P.5/1. The objective is:

(a) To give the Director General and the Agency's Policy-making Organs legal advice and to provide legal services to the Secretariat in relation to all matters concerning the operations of the Agency;

(b) To draft, negotiate and conclude agreements with States and other international organizations and to advise on the interpretation and application thereof, in particular with regard to safeguards and host-country agreements;

(c) To defend the Agency's interests in contentious cases;

(d) To follow and promote developments in international law - and in particular nuclear law - which are of interest to the Agency;

(e) To carry out training of officials of Member States and to provide advisory services to Member States in nuclear law and regulatory matters; and

(f) To collect, study and disseminate information on nuclear law with a view to assisting Member States.

STRUCTURE

P.5/2. This sub-programme includes two special projects, "International plutonium storage" and "International spent fuel management". They are described separately below.

PLANS FOR 1983-84

P.5/3. Assistance will be provided in the negotiation (in co-operation with the Division of External Relations), conclusion and application of safeguards agreements with Member States and with other States which are party to NPT; such agreements will include safeguards agreements for the purposes of the Tlatelolco Treaty and full-scope safeguards agreements as appropriate. Safeguards measures will be kept under review and the Legal Division will contribute to the development of non-proliferation measures.

P.5/4. Advice and assistance will be given in connection with the legal and institutional aspects of studies under Agency auspices, in particular the work of the Committee on Assurances of Supply (CAS).

P.5/5. Legal aspects of the physical protection of nuclear material and nuclear facilities will continue to receive attention. This will include depositary functions for the Convention on the Physical Protection of Nuclear Material, opened for signature on 3 March 1980, advisory functions for the organization of training courses on physical protection and the review of the recommendations on the Physical Protection of Nuclear Material [P.1].

P.5/6. Legal assistance will be provided to the "Waste Management" programme in a continuing review, scheduled for completion in 1984, of the Agency's Revised Definition and Recommendations for the purposes of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, and in the discharge of responsibilities entrusted to the Agency under regional conventions such as the Convention for the Protection of the Mediterranean Sea against Pollution.

P.5/7. Within the "Radiological safety" sub-programme, advice will continue to be provided on the legal aspects of the Agency's Regulations for the Safe Transport of Radioactive Materials. In view of difficulties encountered in the international transport of some nuclear materials despite the wide acceptance of the Agency's Regulations, a seminar will be organized in 1984 in collaboration with the "Radiological safety" sub-programme to survey national practices and experiences, identify problems and explore ways of dealing with them (Annex II(21)). Assistance will also be given with training courses and the provision of advisory services on the purview and implementation of the Agency's Regulations.

P.5/8. Legal assistance will be given to the "Nuclear Safety" programme in the elaboration of codes of practice and guides for the safety of nuclear power plants, the holding of training courses on regulatory aspects of nuclear power programmes and the provision of advisory services on governmental organization related thereto.

P.5/9. A review conference (Annex II(22)) for the Vienna Convention on Civil Liability for Nuclear Damage will take place in 1984 if one third of the contracting parties request it. The matter will first be considered in 1984 by the Standing Committee on Civil Liability for Nuclear Damage, established by the Board of Governors in 1963 for the purposes of the Convention. In 1983, the Agency will co-sponsor with OECD/NEA a symposium on the Paris Convention and its relationship to the Vienna Convention.

P.5/10. The negotiation and implementation of international conventions that may have an impact on the Agency will be closely followed; such conventions include those on the law of the sea, protection of the marine environment, the carriage of hazardous substances other than oil by sea, international multimodal transport and the law of treaties between States and international organizations or between two or more international organizations. Co-operation with UNEP in studies on, and developments of, environmental law will continue through participation in expert group meetings.

P.5/11. Assistance will be given in framing and implementing legal arrangements for projects under the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA). The negotiation and conclusion of supply and project agreements for Agency assistance to Member States in securing the transfer of special fissionable material for reactor projects will continue to be the responsibility of the Legal Division. Legal support will be provided to the "Technical Co-operation" programme, especially with the simplification of legal arrangements through acceptance of the Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the Agency.

P.5/12. Training of officials of Member States in nuclear law and regulatory matters will continue to be provided by means of in-service training and interregional seminars. The next seminar - on nuclear law and safety regulations - is to be held in 1983 (Annex I(19)). The provision of advisory services to developing countries in the elaboration and implementation of nuclear legislation will continue.

P.5/13. The Legal Division will continue to be responsible for formalities concerning the Agency's contractual and treaty relationships, including depositary functions, and for legal aspects of administration, including litigation, and will advise on and assist in the development of the Agency's internal law and procedures.

NEW DEVELOPMENTS FORESEEN FOR 1985-88

P.5/14. Transfrontier aspects of the use of nuclear power may call for the consideration and elaboration of regional conventions.

[P.1] It is planned to transfer responsibility for the physical protection programme to an appropriate technically-oriented executive division as from 1 January 1983.

P.5/15. Regional conventions may be adopted on mutual emergency assistance in connection with nuclear accidents.

P.5/16. The work of the Committee on Assurances of Supply may lead to legal documentation on fuel bank, financial and other international arrangements for facilitating nuclear supplies.

(a) International plutonium storage

Objective

P.5/17. The objective is to service a group of experts from over 30 Member States preparing proposals for international plutonium storage as a safeguards measure in implementation of Article XII.A.5 of the Agency's Statute; and to implement such proposals, in association with safeguards, if they are subsequently approved by the Board of Governors.

Results to date

P.5/18. Six meetings of the expert group on international plutonium storage were held between December 1978 and the end of 1981, together with meetings of the four technical sub-groups which have been established.

Plans for 1983-84

P.5/19. It is expected that a report will be submitted to the Board of Governors at the beginning of 1983. Action thereafter will depend on decisions by the Board. (Two meetings have been tentatively planned for 1983.)

Costs of legal services

Table P.9

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	415 274
Consultants	18 116
Temporary assistance	4 988
Sub-total	438 378
Common staff costs	148 350
Travel	7 403
Meetings	
Conferences, symposia, seminars	-
Technical committees, advisory groups	252
Representation and hospitality	784
Common services, supplies and equipment	451
Transfer of costs:	
Translation and records services	16 899
Printing and publishing services	53 618
Data processing services	7 734
To other: PNE	(23 000)
Safeguards	(150 000)
Conference and contracts services	-
TOTAL	500 869

Co-operation with other organizations

P.5/20. The CEC is participating in the work of the expert group and its sub-groups.

(b) International spent fuel management

Objective

P.5/21. The objective is to study the potential for international co-operation in the management of spent fuel and to determine the appropriate role which the Agency might play in solving problems created by growing accumulations of spent fuel.

Results to date

P.5/22. An expert group held a series of meetings during 1979-81. A report on the technical and economic aspects of spent fuel management was completed in 1981 and another on institutional aspects in 1982. The expert group completes its work during 1982.

Plans for 1983-84

P.5/23. Primary responsibility for following up the recommendations of the expert group will be with the Division of Nuclear Fuel Cycle. The Legal Division will continue to provide advice on institutional matters.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
443 000	43 000	-	43 000	486 000	530 000	572 000
-	-	-	-	-	-	-
-	-	10 500	10 500	10 500	-	-
443 000	43 000	10 500	53 500	496 500	530 000	572 000
136 800	19 000	-	19 000	155 800	169 600	183 000
8 000	800	(1 300)	(500)	7 500	7 000	8 000
-	-	31 000	31 000	31 000	70 000	45 000
33 000	3 000	(36 000)	(33 000)	-	16 000	-
700	100	200	300	1 000	2 200	800
2 500	100	(1 400)	(1 300)	1 200	1 200	1 200
98 000	3 000	(73 000)	(70 000)	28 000	30 000	32 000
20 000	2 000	13 000	15 000	35 000	5 000	5 000
8 000	1 000	-	1 000	9 000	9 000	9 000
-	-	-	-	-	-	-
(165 000)	(6 000)	-	(6 000)	(171 000)	(184 000)	(198 000)
3 000	-	24 000	24 000	27 000	1 000	1 000
588 000	66 000	(33 000)	33 000	621 000	657 000	659 000

SUB-PROGRAMME P.6

Personnel services (including the VIC Medical Service)

OBJECTIVE

P.6/1. The objective is to implement and further develop the Agency's personnel management system in accordance with the Statute, the Staff Regulations and directives of the Board of Governors, in order to contribute to the functions of the Agency by providing the required human resources and ensuring their optimum utilization.

PLANS FOR 1983-88

P.6/2. The Division of Personnel will:

(a) Recruit and maintain the staff required by the Agency with due regard to the statutory requirements of securing employees of the highest standards of efficiency, technical competence and integrity, and of maintaining a proper geographical balance;

(b) Take the necessary steps to implement General Conference resolution GC(XXV)/RES/386 designed to increase substantially the number of staff members drawn from developing areas at all levels and particularly at the senior and policy-making levels;

Costs of personnel services

Table P.10

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	732 387
Consultants	-
Overtime	-
Temporary assistance	27 614
Sub-total	760 001
Common staff costs	261 633
Travel	5 227
Meetings	
Technical committees, advisory groups	3 623
Representation and hospitality	333
Common services, supplies and equipment	3 124
Other items of expenditure	1 250
Transfer of costs:	
Translation and records services	44 933
Printing and publishing services	82 894
Data processing services	137 985
TOTAL	1 301 003

(c) Review, and revise if necessary, the conditions of employment, and develop improved methods of personnel management which ensure optimum utilization of the available manpower and better motivation of staff;

(d) Participate in the activities of ICSC, CCAQ and other common-system organs established for the purpose of co-ordinating personnel policy with a view to establishing a unified international civil service;

(e) Administer the staff benefit package, as defined in the Staff Regulations and Staff Rules, a job classification system and a staff training programme; and

(f) Operate, in co-operation with the relevant technical Divisions, a traineeship programme for young graduates from developing Member States (12-15 per year). The training and experience provided (initially in connection mainly with safeguards) would help the trainees to compete for junior professional posts in the Agency (though the award of a traineeship would not be a guarantee of such employment) and would also enhance their usefulness to their home country.

(g) Operate the VIC Medical Service.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
832 000	58 000	14 000	72 000	904 000	991 000	1 086 000
-	-	-	-	-	7 000	7 000
1 100	100	300	400	1 500	1 600	1 700
10 800	1 000	3 400	4 400	15 200	28 700	31 000
843 900	59 100	17 700	76 800	920 700	1 028 300	1 125 700
258 600	25 500	4 000	29 500	288 100	317 600	347 800
6 600	300	(3 600)	(3 300)	3 300	3 500	3 900
-	-	-	-	-	-	-
1 200	100	100	200	1 400	1 400	1 500
2 500	300	400	700	3 200	3 500	3 900
3 200	300	300 800	301 100	304 300	304 700	305 200
58 000	5 000	(7 000)	(2 000)	56 000	60 000	64 000
56 000	5 000	25 000	30 000	86 000	93 000	93 000
98 000	9 000	75 000	84 000	182 000	264 000	318 000
1 328 000	104 600	412 400	517 000	1 845 000	2 076 000	2 263 000

Costs of medical service

Table P.11

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	160 395
Temporary assistance	10 109
Sub-total	170 504
Common staff costs	56 601
Travel	4 278
Representation and hospitality	468
Common services, supplies and equipment	52 069
Other items of expenditure	783
Transfer of costs:	
Translation and records services	480
Printing and publishing services	2 879
Data processing services	236
TOTAL	288 298

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
169 000	18 000	20 000	38 000	207 000	228 000	246 000
6 600	-	(6 600)	(6 600)	-	-	-
175 600	18 000	13 400	31 400	207 000	228 000	246 000
52 500	7 200	7 000	14 200	66 700	73 000	78 300
2 300	200	-	200	2 500	2 500	2 700
1 400	100	-	100	1 500	1 500	1 500
44 100	4 400	13 500	17 900	62 000	62 000	67 500
2 100	200	-	200	2 300	3 000	3 000
-	-	-	-	-	-	-
4 000	-	-	-	4 000	4 000	4 000
10 000	1 000	3 000	4 000	14 000	17 000	17 000
292 000	31 100	36 900	68 000	360 000	391 000	420 000

Q. GENERAL SERVICES

COSTS OF THE PROGRAMME

Summary by items of expenditure: Table Q.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	1 857 233
Consultants	18 491
Overtime	15 264
Temporary assistance	63 590
Sub-total	1 954 578
Common staff costs	663 463
Travel	1 625
Representation and hospitality	210
Common services, supplies and equipment	7 207 773
Other items of expenditure	323
Transfer of costs:	
Translation and records services	6 943
Printing and publishing services	62 834
Data processing services	42 767
TOTAL	9 940 516

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 161 000	32 000	14 000	46 000	2 207 000	2 417 000	2 611 000
-	-	-	-	-	-	-
12 400	1 000	3 600	4 600	17 000	26 000	28 000
79 100	5 900	(15 000)	(9 100)	70 000	75 000	80 000
2 252 500	38 900	2 600	41 500	2 294 000	2 518 000	2 719 000
670 100	32 000	5 000	37 000	707 100	773 500	835 500
1 000	100	3 400	3 500	4 500	3 000	5 000
400	-	-	-	400	500	500
8 053 000	1 259 000	(925 000)	334 000	8 387 000	9 290 000	10 186 000
-	-	-	-	-	-	-
7 000	1 000	1 000	2 000	9 000	10 000	11 000
142 000	5 000	(92 000)	(87 000)	55 000	58 000	62 000
21 000	2 000	7 000	9 000	30 000	40 000	40 000
11 147 000	1 338 000	(998 000)	340 000	11 487 000	12 693 000	13 859 000

SUMMARY OF MANPOWER

Table Q.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	2	1	1	1	2	2	2
P-4	3	3	3	(1)	2	2	2
P-3	1	1	1	-	1	1	1
P-2	1	1	1	-	1	1	1
Sub-total	8	7	7	-	7	7	7
GS	69	68	68	3	71	71	71
M&O	30	29	29	(2)	27	27	27
TOTAL	107	104	104	1	105	105	105

CHANGES IN COSTS AND MANPOWER

Costs

Q/1. As will be seen from Table Q.1 above, it is expected that the cost of this programme will increase by $340 000 as a net result of price increases of $1 338 000 and a programme decrease of $998 000.

Q/2. The programme increase of $19 000 in respect of salaries for established posts and common staff costs is related to the addition of one GS post. Programme increases are also foreseen in respect of overtime ($3600) and travel ($3400), but these are more than offset by a programme decrease in respect of temporary assistance ($15 000). On the basis of the operating experience so far gained at the VIC, it is expected that owing to the strict economy measures taken a programme decrease of $925 000 will be possible in respect of common services, supplies and equipment.

Q/3. As regards the allocation of service costs, programme increases are foreseen in respect of linguistic services ($1000) and data processing services ($7000), while a programme decrease of $92 000 is expected under printing and publishing services.

Q/4. Income from the sale of surplus property is expected to be $50 000.

Manpower

Q/5. As will be seen from Table Q.2 above, the addition of one GS post is foreseen for 1983. Justification for the new post is provided in Annex IV. The upgrading of one P-4 post to the P-5 level and of two M&O posts to the GS level is also foreseen. Detailed justifications are provided in Annex IV.

Q/6. No further manpower changes are foreseen for 1984 and 1985.

THE PROGRAMME

OBJECTIVE

Q/7. The objective is to provide support services to the Agency (in particular the following: purchase and supply services; engineering and technical services, including such services for the Agency's laboratories in Seibersdorf, the Monaco Laboratory and the Trieste Centre; telecommunications and transport services; archive services; registry, mailing and mail distribution services; and electronics services for Agency meetings); to carry out inventory checks on Agency property; to provide various staff services (within the framework of the VIC common services to operate the VIC Commissary and the VIC Housing Service for the international organizations and the Permanent Missions in Vienna); to participate in the technical and financial management of the VIC; and to verify the Agency's financial share in VIC operating costs.

PLANS FOR 1983-88

Q/8. The Division will continue to provide the services outlined above.

Q/9. The Division will further continue its efforts - in close co-operation with other users of the VIC complex - to reduce energy consumption and the various VIC operating costs.

CO-OPERATION WITH OTHER ORGANIZATIONS

Q/10. The technical and financial management of the VIC complex requires close co-operation with UNIDO and the United Nations Office at the VIC.

Costs of common services, supplies and equipment

Table Q.3

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Division of General Services					
Services:					
Communications	524 402	600 000	650 000	720 000	780 000
Freight and transportation	29 065	54 000	45 000	50 000	55 000
Rental of premises	32 234	31 000	38 000	45 000	48 000
Servicing of office equipment	52 081	75 000	65 000	72 000	78 000
Utilities	1 977 841	2 385 000	2 280 000	2 546 000	2 809 000
Maintenance services (contractual)	1 835 955	2 510 700	2 519 700	2 790 700	3 060 700
Maintenance services (in house)	818 801	880 000	890 000	980 000	1 095 000
Security services (in house)	689 604	863 000	870 000	965 000	1 040 000
Sinking Fund, major repairs	33 300	33 300	33 300	33 300	33 300
Other	31 272	33 000	105 000	112 000	125 000
Sub-total	6 024 555	7 465 000	7 496 000	8 314 000	9 124 000
Supplies:					
Building and maintenance supplies	466 607	230 000	325 000	360 000	395 000
Office supplies	161 940	140 000	180 000	190 000	200 000
Expendable equipment	360 257	95 000	150 000	160 000	170 000
Other	340	5 000	6 000	6 000	7 000
Sub-total	989 144	470 000	661 000	716 000	772 000
Equipment:					
Building, property and maintenance equipment	80 001	-	80 000	90 000	100 000
Office furniture and equipment	106 336	99 000	130 000	145 000	160 000
Transportation equipment	7 737	19 000	20 000	25 000	30 000
Sub-total	194 074	118 000	230 000	260 000	290 000
TOTAL	7 207 773	8 053 000	8 387 000	9 290 000	10 186 000

VIC Operating Costs

Table Q.4

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Utilities	1 977 841	2 385 000	2 280 000	2 546 000	2 809 000
Operation and maintenance contract	613 566	740 000	700 000	750 000	830 000
Contractual maintenance services	584 286	933 700	989 700	1 140 700	1 280 700
Cleaning	638 103	837 000	830 000	900 000	950 000
Building and maintenance staff	818 801	880 000	890 000	980 000	1 095 000
Security services staff costs	689 604	863 000	870 000	965 000	1 040 000
Building and maintenance supplies	466 607	230 000	325 000	360 000	395 000
Building, property and maintenance equipment	80 001	-	80 000	90 000	100 000
Sinking Fund, major repairs	33 300	33 300	33 300	33 300	33 300
TOTAL	5 902 109	6 902 000	6 998 000	7 765 000	8 533 000

R. SERVICE ACTIVITIES

THE PROGRAMME

R/1. This programme consists of the two sub-programmes which are dealt with separately below. Since each sub-programme is solely concerned with the provision of services in support of the Agency's functional programmes, the total cost in each case is entirely apportioned between those programmes which require the services.

COSTS OF TRANSLATION AND RECORDS SERVICES

Summary by item of expenditure: Table R.1

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 188 717
Overtime	10 610
Temporary assistance	200 230
Sub-total	2 399 557
Common staff costs	779 569
Travel	344
Scientific and technical contracts	7 359
Common services, supplies and equipment	81
Transfer of costs:	
Translation and records services	(3 190 794)
Printing and publishing services	3 749
Data processing services	135
TOTAL	-

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 384 000	195 000	-	195 000	2 579 000	2 815 000	3 040 000
15 000	1 000	(6 000)	(5 000)	10 000	22 000	24 000
205 000	16 000	(4 000)	12 000	217 000	375 000	186 000
2 604 000	212 000	(10 000)	202 000	2 806 000	3 212 000	3 250 000
739 100	86 800	-	86 800	825 900	897 800	972 700
1 900	200	-	200	2 100	2 200	2 300
12 000	1 000	(1 000)	-	12 000	23 000	24 000
-	-	-	-	-	-	-
(3 387 000)	(302 000)	(7 000)	(309 000)	(3 696 000)	(4 190 000)	(4 309 000)
3 000	-	-	-	3 000	3 000	3 000
27 000	2 000	18 000	20 000	47 000	52 000	57 000
-	-	-	-	-	-	-

SUMMARY OF MANPOWER (TRANSLATION AND RECORDS SERVICES)

Table R.2

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	4	4	4	-	4	4	4
P-4	11	11	11	-	11	11	11
P-3	23	23	23	-	23	23	23
Sub-total	39	39	39	-	39	39	39
GS	37	35	35	-	35	35	35
M&O	1	1	1	-	1	1	1
TOTAL	77	75	75	-	75	75	75

TRANSLATION AND RECORDS SERVICES: BREAKDOWN OF COSTS BY PROGRAMME

Table R.3

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Technical assistance and co-operation	226 237	275 000	294 000	330 000	368 000
Nuclear power	81 901	81 000	84 000	90 000	96 000
Nuclear fuel cycle	125 557	68 000	73 000	119 000	134 000
Nuclear safety	516 953	436 000	500 000	528 000	484 000
Nuclear explosions for peaceful purposes	-	4 000	4 000	6 000	6 000
Food and agriculture	83 303	98 000	115 000	144 000	153 000
Life sciences	24 877	51 000	49 000	67 000	56 000
Physical sciences	72 109	82 000	68 000	77 000	74 000
The Laboratory	5 633	29 000	16 000	16 000	24 000
International Laboratory of Marine Radioactivity	655	1 000	1 000	1 000	2 000
Safeguards	100 215	233 000	192 000	206 000	221 000
Information and technical services	53 338	64 000	68 000	72 000	98 000
Policy-making Organs	1 507 736	1 452 000	1 762 000	2 023 000	2 046 000
Executive management and technical programme planning	41 003	42 000	39 000	41 000	43 000
Administration	340 254	459 000	418 000	456 000	488 000
General services	6 943	7 000	9 000	10 000	11 000
Service activities	4 080	5 000	4 000	4 000	5 000
TOTAL	3 190 794	3 387 000	3 696 000	4 190 000	4 309 000

Linguistic services

(Translation and records services and interpretation services)

SUMMARY OF MANPOWER (INTERPRETATION SERVICES)

Table R.4

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
P-5	1	1	1	-	1	1	1
P-4	4	4	4	-	4	4	4
P-3	3	3	3	-	3	3	3
Sub-total	8	8	8	-	8	8	8
GS	1	1	1	-	1	1	1
TOTAL	9	9	9	-	9	9	9

CHANGES IN COSTS

R/2. As will be seen from Table R.1 above, the total cost of linguistic services (translation and records services provided by the Division of Languages) will be charged to the programmes for which these services are provided. Interpretation costs are not included in Table R.1 but are charged direct to meetings requiring interpretation. The manning table of the Interpretation Section is, however, shown (Table R.4).

R/3. The costs of translation and records services are expected to increase by $309 000 as a result of salary and other price increases of $302 000 and a programme increase of $7000. The programme increase of ($18 000) required in respect of data processing services, including word processing, will be partly offset by programme decreases in respect of overtime ($6000), temporary assistance ($4000) and contractual services ($1000).

Linguistic Services

Objective

R/4. The objective is to provide linguistic services in order to achieve the necessary communication through which the Agency identifies, and deliberates on, issues relevant to international co-operation. These services - interpretation and translation - are essential to the Agency for discharging its information and communication responsibilities.

Interpretation

R/5. Depending on the character and scope of any meeting held or sponsored by the Agency, simultaneous interpretation from and into four languages may have to be provided. The order English, French, Russian and Spanish reflects the frequency of use of these four languages; in addition, German is occasionally required. From 1982, interpretation from and into Arabic will be provided at sessions of the General Conference. The interpretation services are also called upon from time to time to assist members of the staff in their day-to-day work by providing consecutive interpretation for meetings of small groups, informal conversations and the like.

Translation and records

R/6. By far the greatest part of the translation work in the Secretariat is from and into English, French, Russian and Spanish (the four working languages of the Policy-making Organs and of the Secretariat). A sizeable workload of translation from and into Arabic has been added with the adoption of Arabic as an official and working language of the General Conference. Some translation from and into German and less from other languages are required. The material translated consists of:

(a) the many different types of document prepared throughout the Secretariat or received from outside for meetings held or sponsored by the Agency;
(b) the records and reports of those meetings;
(c) documents for publication;
(d) correspondence;
(e) public information material;
(f) working papers of all kinds required by the staff for their day-to-day work.

R/7. The summary records of meetings of the Policy-making Organs and the records of the discussions held at scientific meetings are produced by the linguistic staff. The Division of Languages also provides advice on linguistic matters to the Secretariat as a whole and is responsible for typing a considerable proportion of the material to be printed by the Agency.

Plans for 1983-88

R/8. Improved efficiency in the translation area will be sought in four ways:

(a) restructuring the translation sections according to the model applied by the United Nations Secretariat;
(b) introducing the practice of self-revision by senior translators as a basic mode of operation;
(c) strengthening the reference and terminology aids to translators by enlargement of the terminology unit and by co-operation with international organizations having computerized terminology systems;
(d) extending the use of word processing to languages other than English (French and Spanish initially and Russian later).

Printing and publishing services

CHANGES IN COSTS AND MANPOWER

Costs

R/9. As will be seen from Table R.5, the cost of printing and publishing services will be charged to the programmes for which services are provided. The total cost of the "Printing and publishing" sub-programme is expected to increase by $222 000 as a net result of salary and other price increases of $436 000 and a programme decrease of $214 000.

R/10. Programme increases will be required in respect of overtime ($12 500), temporary assistance ($26 500), contractual services ($1800) and "Other items of expenditure" ($900 for training). Programme decreases are foreseen in respect of travel ($2900) and of common services, supplies and equipment ($289 800) where it is hoped that no machinery will have to be replaced.

R/11. As regards the allocation of service costs, there will be a programme decrease in translation and records services ($1000) and a programme increase in respect of data processing services ($38 000, resulting from the expansion of the automatic costing and documents control system).

R/12. It is expected that income from the sale of publications will amount to $880 000 in 1983.

Manpower

R/13. As will be seen from Table R.6, one P-3 post is transferred to this programme in the adjusted manning table for 1982 to accommodate the upgrading of a P-2. The vacated P-2 post is used for the upgrading of a GS post in accordance with the results of a manpower survey. The redundant GS post is transferred to the Division of Budget and Finance. Justifications are given in Annex IV.

R/14. No further changes in manpower are foreseen for 1984 and 1985.

Printing and publishing services

COSTS OF THE SUB-PROGRAMME

Summary by items of expenditure: Table R.5

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	2 465 537
Overtime	26 568
Temporary assistance	33 349
Sub-total	2 525 454
Common staff costs	826 995
Travel	1 474
Representation and hospitality	-
Scientific and technical contracts	1 935
Common services, supplies and equipment	1 192 694
Otner items of expenditure	-
Transfer of costs:	
Translation and records services	4 080
Printing and publishing services	(4 729 207)
Data processing services	176 575
TOTAL	-

SUMMARY OF MANPOWER

Table R.6

Grade of post	Number of established posts						
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
D	1	1	1	-	1	1	1
P-5	1	1	1	-	1	1	1
P-4	1	1	1	-	1	1	1
P-3	4	4	5	-	5	5	5
P-2	6	6	6	-	6	6	6
P-1	1	-	-	-	-	-	-
Sub-total	14	13	14	-	14	14	14
GS	112	113	112	-	112	112	112
M&O	19	18	18	-	18	18	18
TOTAL	145	144	144	-	144	144	144

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
2 671 000	200 000	-	200 000	2 871 000	3 140 000	3 390 000
19 000	1 500	12 500	14 000	33 000	41 000	40 800
11 000	900	26 500	27 400	38 400	57 600	49 800
2 701 000	202 400	39 000	241 400	2 942 400	3 238 600	3 480 600
828 100	90 300	-	90 300	918 400	1 005 200	1 085 200
4 700	200	(2 900)	(2 700)	2 000	2 000	2 000
200	-	-	-	200	200	200
3 000	200	1 800	2 000	5 000	5 000	5 000
1 394 000	134 800	(289 800)	(155 000)	1 239 000	1 487 000	1 601 000
1 000	100	900	1 000	2 000	1 000	1 000
5 000	-	(1 000)	(1 000)	4 000	4 000	5 000
(5 026 000)	(436 000)	214 000	(222 000)	(5 248 000)	(5 933 000)	(6 379 000)
89 000	8 000	38 000	46 000	135 000	190 000	199 000
-	-	-	-	-	-	-

Printing services

Objective

R/15. The objective is to provide printing and distribution services for Agency documents and publications, to provide reproduction facilities to meet the requirements of the General Conference, the Board of Governors and the Secretariat (including the scientific publications programme and INIS) and to meet, on a reimbursable basis, the reproduction requirements of the United Nations organizations participating in the VIC Printing Service (VICPS).

Results to date

R/16. During 1981, the volume of reproduction work just exceeded 200 million printed page-units. A 10% increase in the workload is expected in 1982 owing to the documentation required for three large international meetings - the International Conference on Nuclear Power Experience, the United Nations Assembly on Aging, and the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space.

Plans for 1983-84

R/17. The volume of printing work will be determined by the activities of the Agency and the United Nations organizations participating in the VICPS.

R/18. The Printing Service will continue to replace old equipment as necessary and adjust its level of staff to the extent required for meeting its obligations to provide an effective common service.

R/19. The staff and investment costs, as determined through the cost-accounting system, will be reimbursed by customers on the basis of work done for them.

R/20. The use of computerized typesetting for producing the Agency's scientific publications and other bulky documents will be expanded.

Publishing services

Objective

R/21. The objective is to prepare, publish and distribute Agency publications emanating either from the Agency's own programmes or from programmes organized in collaboration with other international organizations. About half of the copies of each publication are provided free of charge to Member States; the remaining copies are put on sale, the revenues forming part of the Agency's income.

Summary of costs by programme component

Table R.7

Programme component	1981 Actual obligations
Publishing services	1 134 879
Reproduction and distribution services	1 947 672
Common printing services	1 646 656
Sub-total	4 729 207
Transfer to other programmes	(4 729 207)
TOTAL	-

Plans for 1983-84

R/22. The Division of Publications will publish the proceedings of all scientific conferences and symposia listed in this document, the reports of certain Technical Committees and Advisory Groups, and also other books and journals reflecting the work of the Agency's scientific programmes. In addition, the Division will publish the INIS Atomindex and other INIS material and CINDA.

R/23 . A continuous effort will be made to maintain a high scientific and editorial standard for all Agency publications and, through broader promotion activities, to increase sales.

R/24. The Division of Publications will also continue to provide services to all users of the VICPS by printing and binding scientific publications and reports.

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 171 000	159 000	(16 000)	143 000	1 314 000	1 434 000	1 551 000
2 080 000	131 000	(48 000)	83 000	2 163 000	2 406 000	2 583 000
1 775 000	146 000	(150 000)	(4 000)	1 771 000	2 093 000	2 245 000
5 026 000	436 000	(214 000)	222 000	5 248 000	5 933 000	6 379 000
(5 026 000)	(436 000)	214 000	(222 000)	(5 248 000)	(5 933 000)	(6 379 000)
-	-	-	-	-	-	-

PRINTING AND PUBLISHING SERVICES: BREAKDOWN OF COSTS BY PROGRAMME

Table R.8

	1981 Actual obligations	1982 Adjusted budget	1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
Technical assistance and co-operation	102 006	134 000	152 000	166 000	188 000
Nuclear power	141 287	411 000	427 000	463 000	514 000
Nuclear fuel cycle	463 714	292 000	368 000	408 000	367 000
Nuclear safety	686 023	546 000	674 000	790 000	770 000
Nuclear explosions for peaceful purposes	32 183	3 000	2 000	2 000	30 000
Food and agriculture	205 325	381 000	330 000	403 000	432 000
Life sciences	281 111	227 000	264 000	273 000	288 000
Physical sciences	431 877	516 000	496 000	514 000	549 000
Laboratory	16 575	19 000	33 000	34 000	37 000
International Centre for Theoretical Physics	76 669	179 000	185 000	190 000	195 000
International Laboratory of Marine Radioactivity	1 464	2 000	2 000	1 000	4 000
Safeguards	134 739	199 000	261 000	207 000	221 000
Information and technical services	1 075 679	928 000	962 000	1 208 000	1 423 000
Policy-making Organs	408 509	505 000	467 000	592 000	630 000
Executive management and technical programme planning	8 459	16 000	18 000	18 000	19 000
Administration	597 004	523 000	549 000	603 000	647 000
General services	62 834	142 000	55 000	58 000	62 000
Service activities	3 749	3 000	3 000	3 000	3 000
TOTAL	4 729 207	5 026 000	5 248 000	5 933 000	6 379 000

S. COST OF WORK FOR OTHERS

Summary of costs by sub-programme

Table S.1

Item of expenditure	1981 Actual obligations
Cost of work for others	2 992 806
TOTAL	2 992 806

Summary of costs by sub-programme

Table S.2

Sub-programme	1981 Actual obligations
Library services	735 596
Data processing services	972 275
Medical services	358 050
Printing services	926 885
TOTAL	2 992 806

Summary of costs by items of expenditure

Table S.3

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	919 700
Consultants	5 000
Overtime	28 400
Temporary assistance	88 252
Sub-total	1 041 352
Common staff costs	310 607
Travel	1 000
Scientific and technical contracts	40 000
Common services, supplies and equipment	1 587 847
Other items of expenditure	12 000
TOTAL	2 992 806

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
3 710 000	307 000	(278 000)	29 000	3 739 000	4 022 000	4 587 000
3 710 000	307 000	(278 000)	29 000	3 739 000	4 022 000	4 587 000

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
723 000	66 000	39 000	105 000	828 000	915 000	996 000
1 473 000	95 000	(211 000)	(116 000)	1 357 000	1 424 000	1 790 000
343 000	42 000	14 000	56 000	399 000	426 000	454 000
1 171 000	104 000	(120 000)	(16 000)	1 155 000	1 257 000	1 347 000
3 710 000	307 000	(278 000)	29 000	3 739 000	4 022 000	4 587 000

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
1 211 000	110 000	-	110 000	1 321 000	1 441 000	1 556 000
4 000	200	2 300	2 500	6 500	7 000	7 700
48 300	1 400	(31 100)	(29 700)	18 600	21 400	23 400
59 900	2 800	(19 700)	(16 900)	43 000	46 400	43 200
1 323 200	114 400	(48 500)	65 900	1 389 100	1 515 800	1 630 300
375 300	48 600	-	48 600	423 900	462 000	497 300
7 900	600	500	1 100	9 000	10 000	11 000
5 000	400	114 600	115 000	120 000	130 000	140 000
1 984 000	141 600	(352 600)	(211 000)	1 773 000	1 877 000	2 277 000
14 600	1 400	8 000	9 400	24 000	27 200	31 400
3 710 000	307 000	(278 000)	29 000	3 739 000	4 022 000	4 587 000

CHANGES IN COSTS AND MANPOWER

Costs

S/1. As will be seen from Table S.1 above, the cost of work for others is expected to increase by $29 000, as a net result of salary and other price increases of $307 000 and a programme decrease of $278 000. As can be seen from Table S.2 above, the programme increases in the Library ($39 000) and in Medical services ($14 000) are offset by programme decreases in respect of data processing services ($211 000) and printing services ($120 000).

Manpower

S/2. The staff working for the Agency-operated common services are, in as far as they fill Agency manning table posts, shown on the manning tables of the respective Agency programmes. With the establishment of common services, the Agency staff in the library and printing services was merged with staff from UNIDO. In addition, the United Nations provided funds for extra-budgetary employment of staff in the Library. There are, however, no manning table posts available in the Agency. In order to regularize this temporary arrangement, the staff on loan to the Agency under the terms of the Memorandum of Understanding for Common Services at the Vienna International Centre, and the staff for whom funds are provided by the United Nations, are shown in this programme. As will be seen from Table S.4 above, there are 6 Professional, 16 GS and 1 M&O staff involved. The total staff costs shown in Table S.3 for work for others, however, do not relate to the staff in Table S.4, but represent a true share of the total cost of manpower working in Agency-operated common services, comprising that of Agency staff and the staff shown in Table S.4.

UNIDO staff on loan and UN funded staff assigned to the Agency-operated Common Services

(not included in the Agency's manning table)

Table S.4

COMMON SERVICES	UNIDO staff on loan	UN funded staff	Total additional staff
LIBRARY SERVICES			
P4	1	-	1
P3	2	2	4
P1	-	1	1
Sub-total	3	3	6
GS	4	4	8
TOTAL	7	7	14
PRINTING SERVICES			
GS	8	-	8
M&O	1	-	1
TOTAL	9	-	9

T. ADJUSTMENT OF PROGRAMME COST ESTIMATES

T. ADJUSTMENT OF PROGRAMME COST ESTIMATES

Item of expenditure	1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
		Price	Programme	Total			
Adjustment of programme cost estimates	-	(3 596 000)	-	(3 596 000)	(3 596 000)	(4 117 000)	(4 517 000)
	-	(3 596 000)	-	(3 596 000)	(3 596 000)	(4 117 000)	(4 517 000)

CHANGES IN COSTS

T/1. The cost estimates in the earlier part of this programme budget are based on an exchange rate of 15.50 Austrian schillings to the United States dollar. Because of the increase in the dollar/schilling exchange rate during recent months, however, an amount of $3 596 000 has been deducted for the adjustment of programme cost estimates - in order to compensate for an assumed average exchange rate of AS 16.30 to the dollar in 1983.

T/2. The draft resolution on the Regular Budget appropriations for 1983 contained in Annex VII is accordingly based on the assumed exchange rate of AS 16.30 to the dollar.

A N N E X E S I - VII

A N N E X I

CONFERENCES, SYMPOSIA AND SEMINARS IN 1983

Within the limits of the appropriation and subject to the requirements of the individual programmes as outlined for 1983, it is planned to hold the meetings listed below. All meetings were considered by the Scientific Advisory Committee. The reference following each meeting is to the relevant paragraph in the programme.

Nuclear power		
1.	Symposium on the reliability of reactor pressure components	B.2.6/3
2.	Seminar on quality assurance for nuclear power plants (Latin America)	B.2.7/3
Nuclear fuel cycle		
3.	Seminar on technical and environmental aspects of spent fuel management	C.1.3/10
4.	Conference on radioactive waste management	C.2/2
5.	Seminar on the assessment of the terrestrial transfer of radionuclides	C.2.3/13
Nuclear safety		
6.	Seminar on radiation protection in the exploration, mining and milling of radioactive ores (Africa)	D.1.1/10
7.	Seminar on exempt shipments of radioactive material transported by post	D.1.3/9
8.	Seminar on the management of nuclear power plants	D.2.1/5(e)
9.	Symposium on the operational safety of nuclear power plants	D.2.4/6
Food and agriculture		
10.	FAO/IAEA symposium on isotope and radiation techniques in soil physics and irrigation studies	F.1.4/3
11.	FAO/IAEA seminar on food irradiation in Latin America	F.6.2/4
Life sciences		
12.	Seminar on calibration procedures in SSDLs	G.2.1/12
13.	Symposium on the biological effects of low-level radiation with special regard to stochastic and non-stochastic effects	G.3.3/5
Physical sciences		
14.	Seminar on radiation detectors (Africa)	H.1.1/7
15.	Seminar on effective utilization and management of research reactors	H.1.2/9
16.	Symposium on isotope hydrology in water resources development	H.3.4/8
Safeguards		
17.	Safeguards workshop seminar	L.5/11
Information and technical services		
18.	INIS training seminar	M.1/9
Legal		
19.	Interregional seminar on nuclear law and safety regulations	P.5/12

A N N E X II

CONFERENCES, SYMPOSIA AND SEMINARS IN 1984

A list of scientific meetings considered by the Scientific Advisory Committee is presented for the second year of the biennium 1983-84. The reference following each meeting is to the relevant paragraph in the programme.

Nuclear power

1.	Seminar on nuclear power plant operations management	B.2.2/3
2.	Symposium on nuclear power plant outage experience	B.2.3/4
3.	Symposium on fast breeder reactors - experience and future trends	B.3.1/4

Nuclear fuel cycle

4.	Seminar on remote handling equipment for nuclear fuel cycle facilities	C.1.2/14
5.	Seminar on practical experience in the application of quality control in water-reactor fuel fabrication	C.1.2/21
6.	Seminar on site investigation and assessment methods and techniques for underground disposal of radioactive wastes	C.2.2/10

Nuclear safety

7.	Symposium on the assessment of radioactive contamination in man	D.1.1/10 and D.1.2/7
8.	Symposium on the implementation of the IAEA Codes of Practice and Safety Guides for Nuclear Power Plants (NUSS)	D.2.1/5(f)
9.	Seminar on diagnosis of and response to abnormal occurrences at nuclear power plants	D.2.4/6

Food and agriculture

10.	FAO/IAEA seminar on the use of isotopes in studies of biological nitrogen fixation	F.1.1/3
11.	FAO/IAEA seminar on the application of isotopes and radiation in tsetse fly control operations (Africa)	F.4.1/7
12.	FAO/IAEA symposium on food irradiation processing	F.6.1/9

Life sciences

13.	Seminar on quality control in radioimmunoassay (Asia and the Pacific)	G.1.2/6
14.	Symposium on high-dose dosimetry	G.2.3/10
15.	Seminar on tissue banking of radiation sterilized grafts for clinical use (Asia and the Pacific)	G.3.1/5

Physical sciences

16.	Conference on plasma physics and controlled nuclear fusion research	H.1.3/8
17.	Conference on radiopharmaceuticals and labelled compounds	H.2.2/14
18.	Seminar on the use of isotope techniques in water resources development (Latin America)	H.3.4/9

Safeguards

19.	Safeguards workshop seminar	L.5/11

Information and technical services

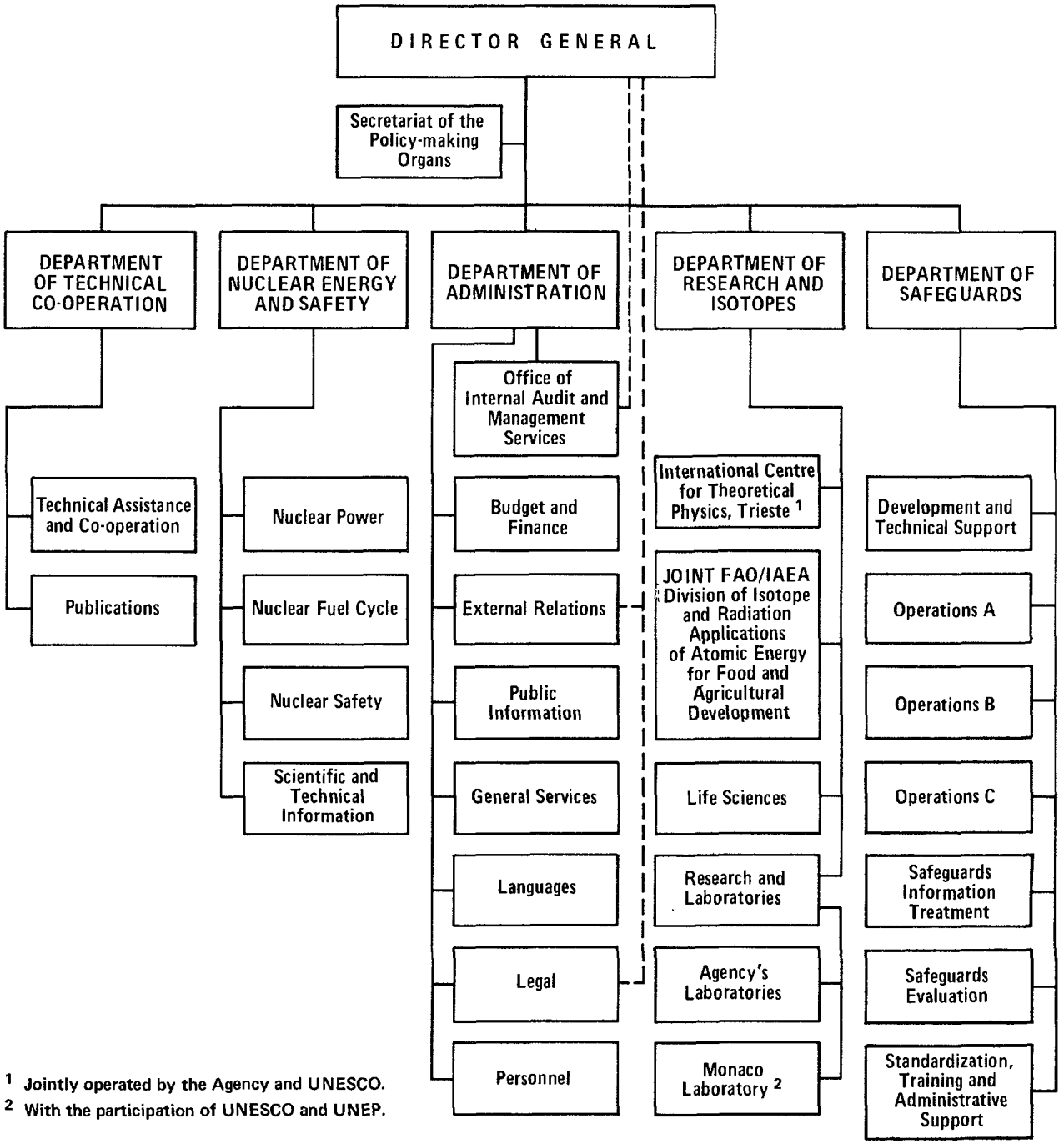
20.	INIS training seminar	M.1/9

Legal

21.	Interregional seminar on the application of the IAEA Regulations for the Safe Transport of Radioactive Materials	P.5/7
22.	Conference to review the Vienna Convention on Civil Liability for Nuclear Damage	P.5/9

ANNEX III

ORGANIZATIONAL CHART



[1] Jointly operated by the Agency and UNESCO.

[2] With the participation of UNESCO and UNEP.

ANNEX IV

THE MANNING TABLE

Manning Table for 1983

Table 1

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	1	1	1	-	1	-	5	5	-	10
Secretariat of the Policy-making Organs	-	-	1	1	-	-	1	-	3	2	-	5
Department of Technical Co-operation a/	-	1	-	-	-	-	1	-	2	2	-	4
Division of Technical Assistance and Co-operation	-	-	1	10	10	8	7	-	36	46	-	82
Division of Publications	-	-	1	1	1	5	6	-	14	112	18	144
Department of Nuclear Energy and Safety	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Power	-	-	1	10	6	5	-	-	22	12	-	34
Division of Nuclear Fuel Cycle	-	-	1	7	13	1	-	-	22	13	-	35
Division of Nuclear Safety	-	-	1	13	11	3	-	-	28	21	-	49
Division of Scientific and Technical Information	-	-	1	6	10	24	11	6	58	64	-	122
Department of Research and Isotopes	-	1	-	-	1	-	1	-	3	6	-	9
Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development	-	-	-	7	6	1	1	-	15	8	-	23
Division of Life Sciences	-	-	1	4	6	1	-	-	12	10	-	22
Division of Research and Laboratories	-	-	1	7	10	7	3	-	28	18	-	46
The Agency's Laboratory	-	-	-	4	11	7	2	1	25	60	27	112
The Monaco Laboratory	-	-	-	2	3	1	3	1	10	13	-	23
International Centre for Theoretical Physics	-	-	-	2	1	2	-	-	5	17	-	22
Department of Safeguards	-	1	-	-	-	-	-	-	1	2	-	3
Division of Operations A	-	-	1	9	25	21	-	-	56	28	-	84
Division of Operations B	-	-	1	6	16	12	-	-	35	17	-	52
Division of Operations C	-	-	1	9	30	22	-	-	62	24	-	86
Division of Development and Technical Support	-	-	1	12	17	2	-	-	32	25	-	57
Division of Safeguards Information Treatment	-	-	1	6	9	2	1	9	28	34	-	62
Division of Safeguards Evaluation	-	-	1	5	9	2	-	-	17	13	-	30
Division of Standardization, Training and Administrative Support	-	-	1	3	5	3	-	-	12	14	-	26
Department of Administration	-	1	-	1	-	-	1	-	3	2	-	5
Office of Internal Audit and Management	-	-	-	1	1	2	1	-	5	5	-	10
Division of Budget and Finance	-	-	1	4	5	6	1	1	18	46	-	64
Division of General Services	-	-	1	2	2	1	1	-	7	71	27	105
Division of External Relations	-	-	2	5	6	4	4	-	21	21	-	42
Division of Public Information	-	-	1	-	2	1	1	-	5	8	-	13
Division of Languages	-	-	1	4	11	23	-	-	39	35	1	75
Legal Division	-	-	1	3	2	1	-	-	7	4	-	11
Division of Personnel	-	-	1	3	4	3	-	-	11	36	3	50
TOTAL	1	5	25	148	234	171	47	19	650	796	76	1 522

a/ The Programme Co-ordination Section which reports to the Deputy Director General is shown together with the Division of Technical Assistance and Co-operation.

Summary of Manpower by Grade of Post and by Department

Table 1.a

Grade of post	Number of established posts							
	1981 Adjusted	1982	1982 Adjusted	Change	1983	1984 Preliminary estimate	1985 Preliminary estimate
DG	1	1	1	-	1	1	1
DDG	5	5	5	-	5	5	5
D	22	22	22	3	25	25	25
P-5	145	144	144	4	148	151	152
P-4	229	234	234	-	234	240	241
P-3	158	161	161	10	171	173	173
P-2	37	38	38	9	47	48	48
P-1	10	7	7	12	19	19	19
Sub-total	607	612	612	38	650	662	664
GS	774	785	785	11	796	830	866
M&O	80	78	78	(2)	76	76	76
TOTAL	1461	1475	1475	47	1522	1568	1606

Department:				P	GS	M&O			
Office of the Director General	15	15	15	-	-	-	15	15	15
Department of Technical Co-operation	225	227	226	2	2	-	230	233	235
Department of Nuclear Energy and Safety	238	240	241	20	(16)	-	245	249	251
Department of Research and Isotopes	252	251	256	1	-	-	257	259	260
Department of Safeguards	355	368	368	15	17	-	400	433	464
Department of Administration	376	374	369	-	8	(2)	375	379	381
TOTAL	1461	1475	1475	38	11	(2)	1522	1568	1606

Extrabudgetary posts for Agency-operated common services - 1983

(not included in the Agency's manning table)

Table 1.b

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Technical Co-operation												
Division of Publications												
Common Printing Services (on loan from UNIDO)	-	-	-	-	-	-	-	-	-	8	1	9
Department of Nuclear Energy and Safety												
Division of Scientific and Technical Information												
Library												
(on loan from UNIDO)	-	-	-	-	1	2	-	-	3	4	-	7
(UN funded)	-	-	-	-	-	2	-	1	3	4	-	7
TOTAL	-	-	-	-	1	4	-	1	6	16	1	23

Total staff in "Common Services" - 1983

Table 1.c

	Agency staff			Other staff			Total staff			Charged to Agency				"Cost of Work for Others"			
	P	GS	M&O	P	GS	M&O	P	GS	M&O	P	GS	M&O	Total	P	GS	M&O	Total
Library	4	11	-	6	8	-	10	19	-	5	8.5	-	13.5	5	10.5	-	15.5
Computer	38	23	-	-	-	-	38	23	-	34	17	-	51.0	4	6	-	10.0
Medical	3	13	3	-	-	-	3	13	3	1.5	5.5	1.5	8.5	1.5	7.5	1.5	10.5
Printing	1	47	12	-	8	1	1	55	13	0.6	33	7.4	41.0	0.4	22	5.6	28.0

New posts for 1983

Table 2

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Technical Co-operation[a/]												
Division of Technical Assistance and Co-operation	-	-	-	1	-	-	1	-	2	2	-	4
Department of Nuclear Energy and Safety												
Division of Nuclear Fuel Cycle	-	-	-	-	-	1	-	-	1	-	-	1
Division of Nuclear Safety	-	-	-	-	1	-	-	-	1	1	-	2
Division of Scientific and Technical Information	-	-	-	-	-	-	-	-	-	1	-	1
Department of Research and Isotopes												
The Agency's Laboratory	-	-	-	-	-	-	-	-	-	1	-	1
Department of Safeguards												
Division of Operations A	-	-	-	-	-	-	-	-	-	12	-	12
Division of Operations B	-	-	-	-	-	-	-	-	-	4	-	4
Division of Operations C	-	-	-	-	-	-	-	-	-	5	-	5
Division of Development and Technical Support	-	-	-	1	-	-	-	-	1	3	-	4
Division of Safeguards Information Treatment	-	-	-	-	1	-	-	-	1	-	-	1
Division of Safeguards Evaluation	-	-	-	-	1	-	-	-	1	1	-	2
Division of Standardization Training and Administrative Support	-	-	-	-	1	1	-	-	2	2	-	4
Department of Administration												
Division of Budget and Finance	-	-	-	-	-	-	(1)	-	(1)	2	-	1
Division of General Services	-	-	-	-	-	-	-	-	-	1	-	1
Division of Public Information	-	-	-	-	1	-	-	-	1	1	-	2
Division of Personnel	-	-	-	-	-	-	-	-	-	2	-	2
TOTAL	-	-	-	2	5	2	-	-	9	38	-	47

a/ The Programme Co-ordination Section which reports to the Deputy Director General is shown together with the Division of Technical Assistance and Co-operation.

ADDITIONAL PROFESSIONAL POSTS IN 1983

Department of Technical Co-operation (1 P-5)

A Post Project Evaluation Officer is needed in the Programme Co-ordination Section to carry out evaluation of on-going projects and analysis of the impact of completed projects.

Division of Technical Assistance and Co-operation (1 P-2)

An additional Programme Officer is needed as a result of programme expansion and an associated increase in the complexity and volume of work in the Middle East and Europe Section. The work involves the monitoring, co-ordination and follow-up of technical assistance and co-operation programmes.

Department of Nuclear Energy and Safety

Division of Nuclear Fuel Cycle (1 P-3)

A Professional officer (Geologist/Data Base Manager) is required to oversee the development and implementation of the INTURGEO information system, to make contact with Member States, to obtain data and to publish results.

Division of Nuclear Safety

A Professional officer (Computer Code Specialist) is needed to assist developing countries with the implementation and operation of complex computer codes for the evaluation of nuclear power plant safety. (1 P-4)

Department of Safeguards

Division of Development and Technical Support (1 P-5)

A Professional officer is required for containment/surveillance work involving electromechanical, electronic and microprocessor technology, including the supervision of the implementation and operation of an increasing number of video and photo surveillance units and seals.

Division of Safeguards Information Treatment (1 P-4)

A Professional officer is needed for co-ordinating the use of computer resources and for maintenance of the computer operating environment as a result of the increased amount of new software and hardware developed and installed in the Department and the expansion of the services provided by the International Safeguards Information System (ISIS).

Division of Safeguards Evaluation (1 P-4)

A Professional officer is required to strengthen work on the evaluation of safeguards approaches and the improvement of safeguards implementation through quality assurance activities involving the detailed examination of safeguards procedures.

Division of Standardization, Training and Administrative Support (1 P-3) (1 P-4)

A Professional officer (P-3) is required to develop and organize a management training programme and to assist with on-going programmes.

An additional Professional officer (P-4) is needed to develop and organize a training programme for young graduates from developing countries.

Department of Administration

Division of Public Information (1 P-4)

An additional post, for an English-mother-tongue writer, is required to increase the writing potential in this Division. The incumbent will write principally on non-proliferation and safeguards matters.

Division of Budget and Finance (less 1 P-2)

One P-2 post will be relinquished in 1983.

TOTAL 9

ADDITIONAL GS POSTS IN 1983

Department of Technical Co-operation

Division of Technical Assistance and Co-operation (2 GS)

Two additional GS posts are needed because of the large increase in the number of training courses and fellowships. One of the posts will provide administrative and clerical support for the implementation of training courses and study tours. The other will be for a clerk involved in the build up of a data bank to help identify training needs, particularly in the nuclear power field.

Department of Nuclear Energy and Safety

Division of Nuclear Safety (1 GS)

An additional GS post is required to provide secretarial services to the Division.

Division of Scientific and Technical Information (1 GS)

An additional GS post is required for a clerk in the Library to speed up handling and circulation of the increasing amount of United Nations documentation. The cost of the post will be shared among the organizations using the Library services.

Department of Research and Isotopes

Agency Laboratories (1 GS)

An additional GS post is required for an operator for the mass spectrometry equipment.

Department of Safeguards

Divisions of Operations A, B and C (21 GS)

Seventeen GS posts are required for inspection assistants to carry out routine activities such as the auditing of records and the servicing of containment and surveillance equipment. This will allow the regular inspectors to concentrate on more specialized activities and will increase their productivity. A further four GS posts are required to provide administrative, secretarial and statistical assistance to inspectors.

Division of Development and Technical Support (3 GS)

The Technical Services Section requires an additional senior video technician and a senior instrument technician as a result of the large expansion in the amount and complexity of NDA and surveillance equipment. The Development of Instruments, Methods and Techniques Section requires an additional technician for the testing and evaluation of instruments.

Division of Safeguards Evaluation (1 GS)

An additional GS post is necessary to provide clerical support for the work on strengthening the evaluation of safeguards approaches and procedures.

Division of Standardization, Training and Administrative Support (2 GS)

Two additional GS posts are required for a secretary and clerk/typist to help with the increased volume of work involved in the Training Section and to assist in setting up the new training programme for young graduates from developing countries.

Department of Administration

Division of Budget and Finance (2 GS)

Extrabudgetary resources made available by Member States have increased from $10 million in 1979 to an estimated $16 million in 1983. One GS post is required for a clerk to assist with the accounting and control of these resources.

One GS post is required for a clerk in the immediate office of the Director to control the flow of correspondence and to provide general typing support for the Division.

Division of General Services (1 GS)

An additional GS post is required in the telecommunications unit to provide part-time assistance for switchboard and telex operations.

Division of Public Information (1 GS)

An additional GS post is required for a clerk to provide secretarial and proof-reading services and to give assistance to Professional staff in the preparation of background information for specialized booklets.

Division of Personnel (2 GS)

An additional GS post is required for a secretary for Professional officers engaged in manpower studies, reclassification exercises and special studies.

An extra GS post is required in the Joint Medical Service for a Head Nurse, who would be responsible for supervising nurses, technicians and cleaning staff, organizing medical campaigns, training new staff and ordering medical supplies.

TOTAL 38

Reclassification of existing posts

Table 3

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Nuclear Energy and Safety												
Division of Nuclear Power	-	-	-	1	(1)	-	-	-	-	-	-	-
Division of Scientific and Technical Information	-	-	-	1	(1)	8	7	3	18	(18)	-	-
Department of Research and Isotopes												
Division of Research and Laboratories	-	-	-	-	-	-	1	-	1	(1)	-	-
International Centre for Theoretical Physics	-	-	-	1	(1)	-	-	-	-	-	-	-
Department of Safeguards												
Division of Operations C	-	-	1	(1)	-	-	-	-	-	-	-	-
Division of Safeguards Information Treatment	-	-	-	-	-	-	1	9	10	(10)	-	-
Division of Safeguards Evaluation	-	-	1	(1)	-	-	-	-	-	-	-	-
Division of Standardization, Training and Administrative Support	-	-	1	(1)	-	-	-	-	-	-	-	-
Department of Administration												
Division of General Services	-	-	-	1	(1)	-	-	-	-	2	(2)	-
Division of Personnel	-	-	-	1	(1)	-	-	-	-	-	-	-
TOTAL	-	-	3	2	(5)	8	9	12	29	(27)	(2)	-

RECLASSIFICATION OF POSTS IN 1983

Department of Nuclear Energy and Safety

Division of Nuclear Power

One P-4 to P-5 (Nuclear Engineer - Infrastructure) (1 P-5)

The Reactor Engineering Section wishes to strengthen the area of its programme relating to infrastructure requirements and nuclear power programme planning in order to enable it to provide essential advice to developing countries. The duties and responsibilities of the post include undertaking missions to advise countries on their nuclear reactor programme capability and providing advice on bilateral agreements. These responsibilities are appropriate to the P-5 level.

Division of Scientific and Technical Information

One P-4 to P-5 (Head, INIS Subject Control) (1 P-5)

As Head of Subject Control, the incumbent exercises supervisory control and leadership over a large staff who are involved in the abstracting and indexing of Agency publications, checking samples of input for quality and processing of computer generated statements. The incumbent provides guidelines and production schedules to his staff and must act as a major innovator in the INIS development area. An overall grasp of the INIS programme is essential to enable the incumbent to prepare documents, journal articles and speeches for senior Agency officers. The appropriate level for this post is the P-5 grade.

One GS post to P-3 (Computer Administration Officer) (1 P-3)

The incumbent heads a computer administration group which is responsible for: co-ordinating the preparation and monitoring of the Computer Section budget; preparing all material for the Computer Committees; negotiating with vendors; maintaining service contracts and ensuring that computer supplies are available; maintaining an inventory for all data processing, word processing and telecommunications facilities; and keeping abreast of new developments in hardware and software. The responsibilities of the post meet the ICSC definition of Professional work. The appropriate level for the post is the P-3 grade.

Seven GS posts to P-3 (7 P-3)
Seven GS posts to P-2 (7 P-2)
Three GS posts to P-1 (3 P-1)

According to Article 13 of its statute, ICSC is responsible for establishing classification standards for fields of work common to several organizations. The ICSC has already established a methodology for classifying posts in the Professional and higher categories and has introduced a methodology for comparing Professional level work with General Service level work. These standards show that the Agency had classified certain posts as General Service which in accordance with the ICSC system and the practice of other organizations should be Professional. The largest single group of such posts is that of the Electronic Data Processing (EDP) specialists. According to a classification survey conducted in the Computer Section of the Division of Scientific and Technical Information, there are 17 posts of EDP programmers and EDP systems analysts which under the ICSC standards should be Professional and should therefore be upgraded.

Department of Research and Isotopes

Division of Research and Laboratories

One GS to P-2 (1 P-2)

In accordance with a classification survey in which ICSC standards have been applied (see above), one post for an EDP specialist in the Nuclear Data Section has to be upgraded from the GS to the P-2 level.

International Centre for Theoretical Physics

One P-4 to P-5 (Administrative and Scientific Administration Officer) (1 P-5)

Owing to the steady growth in the activities of the Centre, the Director has given the incumbent increased responsibility for course organization, liaison with academics in the Trieste area and with governments involved in the Centre, contacts with scientists, course participants, United Nations officials, local organizations and local authorities, and the administrative and financial running of the Centre. These increased responsibilities are appropriate to the P-5 grade.

Department of Safeguards

Three P-5 to D-1 (3 D-1)

In connection with the reorganization of the Department of Safeguards and the establishment of three new Divisions, i.e. the Division of Operations C, the Division of Safeguards Evaluation and the Division of Standardization, Training and Administrative Support, the reclassification of three P-5 posts to the Director level is required.

Division of Safeguards Information Treatment

One GS to P-2 (1 P-2)
Nine GS to P-1 (9 P-1)

In accordance with the ICSC standards for EDP specialists (see above), the reclassification of ten GS posts to the P-1 and P-2 levels is required.

Department of Administration

Division of General Services

One P-4 to P-5 (Head, Inventory, Supply and Transportation Services) (1 P-5)

With the reorganization of the Division of General Services in 1980, an Inventory and Supply Services Section was established. In 1981, transportation and other duties were added. In addition to the increased duties, the Section Head is responsible for the establishment, co-ordination and verification of all General Services budgetary and financial matters, including the VIC operating costs. The handling of the Agency's share of the VIC operating costs is a completely new task, arising since the move to the VIC. It involves considerable responsibility in view of the size and complexity of the expenditures and the constant efforts that need to be made to reduce the costs. The responsibilities and duties assigned to the Section Head exceed those of a P-4 grade and are commensurable with the P-5 grade.

One M&O to GS (Supply and Stationary Unit) (2 GS)
One M&O to GS (Archives)

A review showed that the duties of these posts have changed so that clerical aspects are preponderant and the posts are now appropriate to the GS rather than the M&O grade.

Division of Personnel

One P-4 to P-5 (Section Head - Personnel Policies and Manpower Section) (1 P-5)

The Section Head has responsibility for a major part of the personnel function in the Agency. The duties include the development and revision of personnel policies and personnel management systems, management of the human resources system, and administration of the staff training programme and social security schemes. The Section Head represents the Administration at important inter-agency organs and at joint staff/management committees within the Secretariat. The responsibilities and duties of the post have increased considerably and are no longer commensurable with the grading of the post at the P-4 level. In accordance with the classification standards promulgated by ICSC and the practice of other organizations, the post should be classified at the P-5 level.

Adjusted Manning Table for 1982

Table 4

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	1	1	1	-	1	-	5	5	-	10
Secretariat of the Policy-making Organs	-	-	1	1	-	-	1	-	3	2	-	5
Department of Technical Co-operation a/	-	1	-	-	-	-	1	-	2	2	-	4
Division of Technical Assistance and Co-operation	-	-	1	9	10	8	6	-	34	44	-	78
Division of Publications	-	-	1	1	1	5	6	-	14	112	18	144
Department of Nuclear Energy and Safety	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Power	-	-	1	9	7	5	-	-	22	12	-	34
Division of Nuclear Fuel Cycle	-	-	1	7	13	-	-	-	21	13	-	34
Division of Nuclear Safety	-	-	1	13	10	3	-	-	27	20	-	47
Division of Scientific and Technical Information	-	-	1	5	11	16	4	3	40	81	-	121
Department of Research and Isotopes	-	1	-	-	1	-	1	-	3	6	-	9
Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development	-	-	-	7	6	1	1	-	15	8	-	23
Division of Life Sciences	-	-	1	4	6	1	-	-	12	10	-	22
Division of Research and Laboratories	-	-	1	7	10	7	2	-	27	19	-	46
The Agency's Laboratory	-	-	-	4	11	7	2	1	25	59	27	111
The Monaco Laboratory	-	-	-	2	3	1	3	1	10	13	-	23
International Centre for Theoretical Physics	-	-	-	1	2	2	-	-	5	17	-	22
Department of Safeguards	-	1	-	-	-	-	-	-	1	2	-	3
Division of Operations A	-	-	1	9	25	21	-	-	56	16	-	72
Division of Operations B	-	-	1	6	16	12	-	-	35	13	-	48
Division of Operations C	-	-	-	10	30	22	-	-	62	19	-	81
Division of Development and Technical Support	-	-	1	11	17	2	-	-	31	22	-	53
Division of Safeguards Information Treatment	-	-	1	6	8	2	-	-	17	44	-	61
Division of Safeguards Evaluation	-	-	-	6	8	2	-	-	16	12	-	28
Division of Standardization, Training and Administrative Support	-	-	-	4	4	2	-	-	10	12	-	22
Department of Administration	-	1	-	1	-	-	1	-	3	2	-	5
Office of Internal Audit and Management	-	-	-	1	1	2	1	-	5	5	-	10
Division of Budget and Finance	-	-	1	4	5	6	2	1	19	44	-	63
Division of General Services	-	-	1	1	3	1	1	-	7	68	29	104
Division of External Relations	-	-	2	5	6	4	4	-	21	21	-	42
Division of Public Information	-	-	1	-	1	1	1	-	4	7	-	11
Division of Languages	-	-	1	4	11	23	-	-	39	35	1	75
Legal Division	-	-	1	3	2	1	-	-	7	4	-	11
Division of Personnel	-	-	1	2	5	3	-	-	11	34	3	48
TOTAL	1	5	22	144	234	161	38	7	612	785	78	1 475

a/ The Programme Co-ordination Section which reports to the Deputy Director General is shown together with the Division of Technical Assistance and Co-operation.

Proposed changes in 1982

Table 5

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Department of Technical Co-operation												
Division of Technical Assistance and Co-operation	-	-	-	-	(1)	-	-	-	(1)	-	-	(1)
Division of Publications	-	-	-	-	-	1	-	-	1	(1)	-	-
Department of Nuclear Energy and Safety												
Division of Nuclear Fuel Cycle	-	-	-	-	1	-	-	-	1	-	-	1
Department of Research and Isotopes	-	-	-	-	1	-	-	-	1	4	-	5
Division of Research and Laboratories	-	-	-	-	-	-	(1)	-	(1)	1	-	-
The Monaco Laboratory	-	-	-	-	-	-	1	-	1	(1)	-	-
Department of Safeguards	-	-	-	(8)	(8)	(3)	-	-	(19)	(20)	-	(39)
Division of Operations A	-	-	-	(3)	(8)	(4)	-	-	(15)	(7)	-	(22)
Division of Operations B	-	-	-	(7)	(22)	(18)	-	-	(47)	(12)	-	(59)
Division of Operations C	-	-	-	10	30	22	-	-	62	19	-	81
Division of Safeguards Information Treatment	-	-	-	(2)	(4)	(1)	-	-	(7)	(4)	-	(11)
Division of Safeguards Evaluation	-	-	-	6	8	2	-	-	16	12	-	28
Division of Standardization, Training and Administrative Support	-	-	-	4	4	2	-	-	10	12	-	22
Department of Administration												
Division of Budget and Finance	-	-	-	-	(1)	(1)	-	-	(2)	(3)	-	(5)
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-

In order to make use of available Manning Table posts, following the annual survey of manpower requirements the Director General has approved a number of transfers of posts within the Secretariat. The explanations are given below.

- One P-4 post from the Division of Technical Assistance and Co-operation is transferred to the Division of Nuclear Fuel Cycle for a geologist who provides expert advice on uranium exploration and production in matters related to technical assistance and co-operation.

- One P-3 post from the Division of Budget and Finance is transferred to the Division of Publications in order to accommodate the upgrading of an editor's post from the P-2 level to P-3. The redundant P-2 post is used for the upgrading of the post of the Chief of the Documents Distribution Unit from the GS to the P-2 level. The vacated GS post is transferred to the Division of Budget and Finance.

- The Contracts Administration Section, consisting of one P-4 post and four GS posts, has been transferred from the Division of Budget and Finance to the Department of Research and Isotopes.

- A P-2 post from the Division of Research and Laboratories is transferred to the Monaco Laboratory where a GS post warrants upgrading to the P-2 level. In exchange, the GS post is transferred to the Division of Research and Laboratories.

- From the Division of Budget and Finance, the Contracts Administration Section (consisting of 1 P-4 and 4 GS posts) is transferred to the

Department of Research and Isotopes, as mentioned above. One P-3 post which is transferred to the Division of Publications, as mentioned above, is exchanged for a GS post. This GS post is required in the Programme and Budget Section for a budget clerk, primarily to check and examine the accuracy of all incoming budget and financial plan submissions. Thus, there is a net reduction of three GS posts in the Division of Budget and Finance.

The reorganization of the Department of Safeguards requires the transfer of 62 Professional and 19 GS posts from the Divisions of Operations A and B to the new Division of Operations C. The Division of Safeguards Evaluation, which comprises 16 Professional and 12 GS posts, is constituted of the previous Safeguards Evaluation Section (consisting of 9 Professional and 8 GS posts) and a Section from the Division of Safeguards Information Treatment (7 Professional and 4 GS posts). The Division of Standardization, Training and Administrative Support consists of 10 Professional and 12 GS posts - previously in two Sections within the Office of the Deputy Director General for Safeguards.

Preliminary Manning Table for 1984

Table 6

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	1	1	1	-	1	-	5	5	-	10
Secretariat of the Policy-making Organs	-	-	1	1	-	-	1	-	3	2	-	5
Department of Technical Co-operation a/	-	1	-	-	-	-	1	-	2	2	-	4
Division of Technical Assistance and Co-operation	-	-	1	10	11	8	7	-	37	48	-	85
Division of Publications	-	-	1	1	1	5	6	-	14	112	18	144
Department of Nuclear Energy and Safety	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Power	-	-	1	10	6	5	1	-	23	12	-	35
Division of Nuclear Fuel Cycle	-	-	1	7	13	1	-	-	22	13	-	35
Division of Nuclear Safety	-	-	1	13	12	3	-	-	29	21	-	50
Division of Scientific and Technical Information	-	-	1	6	10	24	11	6	58	66	-	124
Department of Research and Isotopes	-	1	-	1	1	-	1	-	4	6	-	10
Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development	-	-	-	7	6	1	1	-	15	8	-	23
Division of Life Sciences	-	-	1	4	6	1	-	-	12	10	-	22
Division of Research and Laboratories	-	-	1	7	10	7	3	-	28	18	-	46
The Agency's Laboratory	-	-	-	4	11	7	2	1	25	60	27	112
The Monaco Laboratory	-	-	-	2	3	1	3	1	10	13	-	23
International Centre for Theoretical Physics	-	-	-	2	1	2	-	-	5	18	-	23
Department of Safeguards	-	1	-	-	-	-	-	-	1	2	-	3
Division of Operations A	-	-	1	9	25	21	-	-	56	34	-	90
Division of Operations B	-	-	1	6	16	12	-	-	35	22	-	57
Division of Operations C	-	-	1	9	30	22	-	-	62	34	-	96
Division of Development and Technical Support	-	-	1	12	20	3	-	-	36	27	-	63
Division of Safeguards Information Treatment	-	-	1	6	10	2	1	9	29	35	-	64
Division of Safeguards Evaluation	-	-	1	6	9	2	-	-	18	14	-	32
Division of Standardization, Training and Administrative Support	-	-	1	4	5	3	-	-	13	15	-	28
Department of Administration	-	1	-	1	-	-	1	-	3	2	-	5
Office of Internal Audit and Management	-	-	-	1	1	2	1	-	5	5	-	10
Division of Budget and Finance	-	-	1	4	5	7	1	1	19	48	-	67
Division of General Services	-	-	1	2	2	1	1	-	7	71	27	105
Division of External Relations	-	-	2	5	6	4	4	-	21	21	-	42
Division of Public Information	-	-	1	-	2	1	1	-	5	8	-	13
Division of Languages	-	-	1	4	11	23	-	-	39	35	1	75
Legal Division	-	-	1	3	2	1	-	-	7	4	-	11
Division of Personnel	-	-	1	3	4	3	-	-	11	37	3	51
TOTAL	1	5	25	151	240	173	48	19	662	830	76	1 568

a/ The Programme Co-ordination Section which reports to the Deputy Director General is shown together with the Division of Technical Assistance and Co-operation.

Preliminary Manning Table for 1985

Table 7

	DG	DDG	D	P-5	P-4	P-3	P-2	P-1	Sub-total	GS	M&O	Total
Office of the Director General	1	-	1	1	1	-	1	-	5	5	-	10
Secretariat of the Policy-making Organs	-	-	1	1	-	-	1	-	3	2	-	5
Department of Technical Co-operation a/	-	1	-	-	-	-	1	-	2	2	-	4
Division of Technical Assistance and Co-operation	-	-	1	10	11	8	7	-	37	50	-	87
Division of Publications	-	-	1	1	1	5	6	-	14	112	18	144
Department of Nuclear Energy and Safety	-	1	-	-	-	1	-	1	3	2	-	5
Division of Nuclear Power	-	-	1	10	6	5	1	-	23	12	-	35
Nuclear Fuel Cycle Division	-	-	1	7	13	1	-	-	22	13	-	35
Division of Nuclear Safety	-	-	1	13	12	3	-	-	29	21	-	50
Division of Scientific and Technical Information	-	-	1	6	10	24	11	6	58	68	-	126
Department of Research and Isotopes	-	1	-	1	1	-	1	-	4	6	-	10
Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development	-	-	-	7	6	1	1	-	15	8	-	23
Division of Life Sciences	-	-	1	4	6	1	-	-	12	10	-	22
Division of Research and Laboratories	-	-	1	7	10	7	3	-	28	18	-	46
The Agency's Laboratory	-	-	-	4	11	7	2	1	25	60	27	112
The Monaco Laboratory	-	-	-	2	3	1	3	1	10	13	-	23
International Centre for Theoretical Physics	-	-	-	2	1	2	-	-	5	19	-	24
Department of Safeguards	-	1	-	-	-	-	-	-	1	2	-	3
Division of Operations A	-	-	1	9	25	21	-	-	56	37	-	93
Division of Operations B	-	-	1	6	16	12	-	-	35	28	-	63
Division of Operations C	-	-	1	9	30	22	-	-	62	53	-	115
Division of Development and Technical Support	-	-	1	13	21	3	-	-	38	28	-	66
Division of Safeguards Information Treatment	-	-	1	6	10	2	1	9	29	35	-	64
Division of Safeguards Evaluation	-	-	1	6	9	2	-	-	18	14	-	32
Division of Standardization, Training and Administrative Support	-	-	1	4	5	3	-	-	13	15	-	28
Department of Administration	-	1	-	1	-	-	1	-	3	2	-	5
Office of Internal Audit and Management	-	-	-	1	1	2	1	-	5	5	-	10
Division of Budget and Finance	-	-	1	4	5	7	1	1	19	49	-	68
Division of General Services	-	-	1	2	2	1	1	-	7	71	27	105
Division of External Relations	-	-	2	5	6	4	4	-	21	21	-	42
Division of Public Information	-	-	1	-	2	1	1	-	5	8	-	13
Division of Languages	-	-	1	4	11	23	-	-	39	35	1	75
Legal Division	-	-	1	3	2	1	-	-	7	4	-	11
Division of Personnel	-	-	1	3	4	3	-	-	11	38	3	52
TOTAL	1	5	25	152	241	173	48	19	664	866	76	1 606

a/ The Programme Co-ordination Section which reports to the Deputy Director General is shown together with the Division of Technical Assistance and Co-operation.

ANNEX V

COSTS OF THE PROGRAMME

International Centre for Theoretical Physics

Item of expenditure	1981 Actual obligations
Salaries and wages	
Established posts	401 525
Consultants	98 798
Overtime	21 483
Temporary assistance	54 322
Sub-total	576 128
Common staff costs	101 785
Travel	10 638
Meetings	
Conferences, symposia, seminars	840 260
Technical committees, advisory groups	-
Representation and hospitality	16 539
Common services, supplies and equipment	528 608
Other items of expenditure	672 309
Transfer of costs:	
Printing and publishing services	76 669
TOTAL	2 822 936
Source of funds	
Regular Budget	852 669
Extrabudgetary resources	1 970 267
T O T A L	2 822 936

1982 Adjusted budget	Increase or (decrease) from 1982			1983 Estimate	1984 Preliminary estimate	1985 Preliminary estimate
	Price	Programme	Total			
535 000	10 000	-	10 000	545 000	634 000	685 000
80 000	5 800	24 200	30 000	110 000	115 000	120 000
18 000	1 400	15 600	17 000	35 000	38 000	40 000
54 000	4 300	(28 300)	(24 000)	30 000	32 000	32 000
687 000	21 500	11 500	33 000	720 000	819 000	877 000
166 000	8 000	-	8 000	174 000	203 000	219 000
23 000	2 500	500	3 000	26 000	28 000	30 000
840 000	92 400	1 172 600	1 265 000	2 105 000	2 313 000	2 350 000
12 000	1 300	700	2 000	14 000	15 000	16 000
12 000	1 000	1 000	2 000	14 000	16 000	16 000
538 000	54 000	49 000	103 000	641 000	705 000	740 000
604 000	48 300	476 700	525 000	1 129 000	931 000	985 000
179 000	14 000	(8 000)	6 000	185 000	190 000	195 000
3 061 000	243 000	1 704 000	1 947 000	5 008 000	5 220 000	5 428 000
1 179 000	94 000	(88 000)	6 000	1 185 000	1 190 000	1 195 000
1 882 000	149 000	1 792 000	1 941 000	3 823 000	4 030 000	4 233 000
3 061 000	243 000	1 704 000	1 947 000	5 008 000	5 220 000	5 428 000

ANNEX VI

Regular Budget Appropriations for 1983

Section		Estimates at 15.50	Adjustment of programme costs	Estimates at 16.30
1.	Technical assistance and co-operation	4 383 000	(182 000)	4 201 000
2.	Nuclear power	3 143 000	(121 000)	3 022 000
	Nuclear fuel cycle	3 110 000	(110 000)	3 000 000
	Nuclear safety	5 301 000	(190 000)	5 111 000
	Information and technical services	4 748 000	(185 000)	4 563 000
	Nuclear explosions for peaceful purposes	13 000	-	13 000
	Nuclear energy and safety	16 315 000	(606 000)	15 709 000
3.	Food and agriculture	4 165 000	(139 000)	4 026 000
	Life sciences	3 092 000	(95 000)	2 997 000
	Physical Sciences	6 100 000	(231 000)	5 869 000
	Research and isotopes	13 357 000	(465 000)	12 892 000
4.	International Centre for Theoretical Physics	1 185 000	(8 000)	1 177 000
	International Laboratory of Marine Radioactivity	1 192 000	(47 000)	1 145 000
	Operational Facilities	2 377 000	(55 000)	2 322 000
5.	Safeguards	30 943 000	(1 044 000)	29 899 000
6.	Policy-making organs	3 218 000	(124 000)	3 094 000
7.	Executive management and technical programme planning	1 695 000	(66 000)	1 629 000
	Administration	8 903 000	(367 000)	8 536 000
	Executive management and administration	10 598 000	(433 000)	10 165 000
8.	General services	11 487 000	(500 000)	10 987 000
9.	Cost of work for others	3 739 000	(187 000)	3 552 000
TOTAL		96 417 000	(3 596 000)	92 821 000

ANNEX VII

Draft resolutions

A. REGULAR BUDGET APPROPRIATIONS FOR 1983

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Regular Budget of the Agency for 1983 [1],

1. Appropriates an amount of $92 821 000 for the Regular Budget expenses of the Agency in 1983 as follows:

Section		United States dollars
1.	Technical assistance and co-operation	4 201 000
2.	Nuclear energy and safety [2]	15 709 000
3.	Research and isotopes [3]	12 892 000
4.	Operational facilities [4]	2 322 000
5.	Safeguards	29 899 000
6.	Policy-making organs	3 094 000
7.	Executive management and administration [5]	10 165 000
8.	General services	10 987 000
9.	Cost of work for others	3 552 000
	TOTAL	92 821 000

2. Decides that the foregoing appropriation shall be financed as follows:

(a) $3 552 000 from income from work for others;

(b) $7 035 000 from other miscellaneous income; and

(c) $82 234 000 from contributions by Member States on the basis of the scale of assessment fixed by the General Conference in Resolution GC(XXVI)/RES/ ; and

3. Authorizes the Director General:

(a) To incur expenditures additional to those for which provision is made in the Regular Budget for 1983, provided that the relevant emoluments of any staff involved and all other costs are entirely financed from revenues arising out of sales, work performed for Member States or international organizations, research grants, special contributions or other sources extraneous to the Regular Budget for 1983; and

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[1] See document GC(XXVI)/666, Table 2.
[2] For the financing of Nuclear power, Nuclear fuel cycle, Nuclear safety, Information and technical services and Nuclear explosions for peaceful purposes.
[3] For the financing of Food and agriculture, Life sciences and Physical sciences.
[4] For the financing of the International Centre for Theoretical Physics (in part) and the International Laboratory of Marine Radioactivity (in part).
[5] For the financing of Executive management and technical programme planning and Administration.

(b) With the prior approval of the Board of Governors, to make transfers between any of the Sections listed in paragraph 1 above.

B. TECHNICAL ASSISTANCE AND CO-OPERATION FUND ALLOCATION FOR 1983

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Agency's technical assistance and co-operation programme for 1983;

1. Decides that for 1983 the target for voluntary contributions to the Technical Assistance and Co-operation Fund shall be $19 million;

2. Notes that funds from other sources, estimated at $1 million, are expected to be available for that programme;

3. Allocates the amount of $20 000 000 for the Agency's technical assistance and co-operation programme for 1983; and

4. Urges all Member States to make voluntary contributions for 1983 in accordance with Article XIV.F of the Statute, with paragraph 2 of its Resolution GC(V)/RES/100 as amended by Resolution GC(XV)/RES/286 or with paragraph 3 of the former Resolution, as appropriate.

C. THE WORKING CAPITAL FUND IN 1983

The General Conference,

Accepting the recommendations of the Board of Governors relating to the Agency's Working Capital Fund in 1983 [1],

1. Approves a level of $2 million for the Agency's Working Capital Fund in 1983;

2. Decides that the Fund shall be financed, administered and used in 1983 in accordance with the relevant provisions of the Agency's Financial Regulations [2];

3. Authorizes the Director General to make advances from the Fund:

(a) Not exceeding $25 000 at any time, to finance temporarily projects or activities of a strictly self-liquidating character which will not necessitate an increase in the Fund in future years; and

(b) With the prior approval of the Board of Governors, unless in his opinion the situation requires immediate action before such approval can be obtained, to meet the cost incurred by the Agency in organizing and rendering emergency assistance to Member States in connection with radiation accidents, up to $50 000 in each case; and

4. Requests the Director General to submit to the Board statements of advances made from the Fund under the authority given in paragraph 3 above.

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[1] See document GC(XXVI)/666, para 36 of the Introduction.
[2] INFCIRC/8/Rev.1 and Mod.1.