

# **TECHNICAL CO-OPERATION REPORT FOR 2000**

**REPORT BY THE DIRECTOR GENERAL**

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**INTERNATIONAL ATOMIC ENERGY AGENCY**



# **PREFACE**

The Board of Governors has requested the transmission to the General Conference of the attached Technical Co-operation Report for 2000, the draft of which was considered by the Board at its June 2001 session.

The Director General is also hereby reporting in fulfilment of the request contained in resolution GC(44)/RES/18 on “Strengthening of the Agency’s technical co-operation activities.”



# FOREWORD

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The Agency's Technical Co-operation Report for 2000 marks the end of the millennium. This report is also the first that has been compiled using data and information produced through a new information technology tool specially developed for this purpose, replacing the Agency's former mainframe computer systems.

This year's report covers three separate topics:

**Part I** fulfils the Agency's obligation under General Conference resolution GC(44)/RES/18 to report on the Strengthening of Technical Co-operation. It covers the period since the last report (i.e., from 1 April 2000 to 31 March 2001). The report examines the finalization of the 2001-2002 technical co-operation programme and several key concepts of the Technical Co-operation Strategy such as Partners in Development, Technical Co-operation among Developing Countries, and the continuing evolution of Regional Resource Centres. Reflecting an important trend in the technical co-operation programme, which was mandated by the General Conference, the report describes the results achieved in several programmes in least developed countries.

**Part II** reports on the major achievements of the technical co-operation programme in 2000 in the different regions of the world. In addition to reviewing the results of national and regional activities in each region by thematic area, this section provides highlights of selected projects that were closed in 2000. The full text of the achievements of all projects closed during the year is available in the electronic version of this report on GovAtom. Section 7 of Part II reports on the inputs supplied and the outputs delivered under the technical co-operation programme of 2000.

**Part III** presents a summary of the financial and non-financial parameters of the technical co-operation programme. The Supplement to this report provides a more detailed review of resources and contributions, disbursements, and non-financial indicators.



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# TECHNICAL CO-OPERATION REPORT FOR 2000

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## PART I: STRENGTHENING OF TECHNICAL CO-OPERATION

### INTRODUCTION

1. The General Conference has requested the Director General to report regularly on the activities of the Agency directed towards strengthening technical co-operation<sup>1</sup>. Part I of the Technical Co-operation Report for 2000 is devoted to that report. Unlike the other parts of the report, which cover the calendar year 2000, this part covers the period since the last report to the General Conference, i.e., 1 April 2000 to 31 March 2001.

#### **1. Finalizing the Programme for 2001-2002**

2. The major efforts of the Agency towards strengthening technical co-operation during the year 2000 can be seen in the finalization of the programme for 2001-2002. Successful project implementation in the coming years will depend on the quality of the projects designed. As it was for the previous biennium, the programme was formulated in line with the Technical Co-operation Strategy<sup>2</sup> endorsed in 1997. Following the principles of results-based programming, work focused on assessing the projects that had been submitted during the previous year, selecting the best ones, and formulating the outputs and activities so that they will achieve sustainable socio-economic impact. This has been achieved through intensive dialogue with the concerned Member States during the year; in particular, it involved increased interaction with mainstream ministries such as health, agriculture, and those responsible for water resources.

3. The programme was fine-tuned through rigorous assessment, and the number of individual projects was reduced as much as possible by consolidating national projects into regional projects wherever this permitted a more rational and cost-effective approach. Also, more comprehensive projects were planned, many of which will last longer than one biennium. In finalizing the project designs, greater efforts were made to identify both the *expected results* -- the direct effect of the delivery of outputs -- and the project *impact*, -- the sustainable effect the entire project will have on the problem originally defined, usually well after project completion. Furthermore, performance indicators were identified for all Model Projects, which will enable the Agency to monitor more effectively the progress in achieving project objectives.

4. Since the adoption of the Technical Co-operation Strategy in 1997, the Agency has gained valuable practical experience with Country Programme Frameworks and Model Projects. As defined in the Technical Co-operation Strategy, Model Projects are those that respond to a real need of the country, produce significant economic or social impact through

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<sup>1</sup> GC(44)/RES/18, "Strengthening of the Agency's Technical Co-operation Activities", September 2000.

<sup>2</sup> GOV/INF/824, 1997

the end-user, reflect the distinct advantages of nuclear technology over other approaches, and attract strong government commitment. Experience has led the Secretariat to refine and highlight one of the Model Project criteria – government commitment – as the central criterion. Projects submitted are expected to be within the core competence of the Agency (i.e., areas such as nuclear safety, radiation protection, and radioactive waste management) or in an area (mainly non-power applications) where there is a national programme enjoying strong government commitment with evidence of significant financial support. Government support is seen as the commitment of resources, either domestic or from foreign partners, to address priority national development issues. Frequently the Agency project will be a small, albeit important, component of a larger national programme, thus ensuring long-term impact. In 2000 the central criterion was used to prioritize projects, in the coming biennium it will be used as a criterion for approval of new projects proposed by governments for Agency consideration.

5. Results-based project design and management is based on the twin principles of transparency and accountability. Throughout 2000 the Agency continued to work with Member States to achieve greater transparency in programme planning and implementation by enhancing their capabilities to participate in this process, *inter alia* through workshops and training courses for national authorities and counterparts aimed at strengthening their management capacity, exchanging ideas, and improving project design skills. For example, a workshop for the Latin America region on strategic planning for nuclear institutions, held in Rio de Janeiro, Brazil, in July 2000, identified new perspectives for linking Agency technical co-operation activities more closely to national development priorities in the countries. A follow-up project aims at establishing strategic planning as an integral part of the management tools and practices in the nuclear sector in Latin American countries. A project formulation meeting was organized in Seoul, Republic of Korea, with the participation of 12 countries from the East Asia and Pacific region, which resulted in the formulation of a regional project for the 2001-2002 technical co-operation programme with the objective of establishing a regional Quality Management Programme for accurate and cost-effective radioisotopic molecular diagnosis of infectious diseases. A meeting for Member States in the Europe region that was held in November 2000 was dedicated to the planning of projects in the areas of nuclear power and safety, which have been the main focus of the Europe technical co-operation programme during the last decade, as well as related high-priority areas including legislative assistance, emergency preparedness, upgrading of radiation protection infrastructure, health, and environment.

## **2. Partnership in Development**

6. In resolution GC(44)/RES/18, the General Conference requested the Director General to continue consultations and interactions with interested States, the competent organizations of the United Nations system, multilateral financial institutions, regional development bodies, and other relevant intergovernmental and non-governmental bodies to ensure co-ordination and optimization of complementary activities.

7. The creation of partnerships with other development organizations is carried out through consultations and interactions at both the policy level and at the project/programme level. Such partnerships enable Agency technical co-operation programmes to have greater impact and to be executed in a more cost-effective manner. A significant achievement at the policy level was the meeting on tsetse eradication in Africa held in Vienna, Austria, January 2001. The meeting brought together for the first time a wide range of different actors in the field, participants from international organizations (IAEA, FAO, WHO, the World Bank), from regional organizations (Organization of African Unity/Inter-African Bureau for Animal Resources [OAU/IBAR], OAU/Farming in Tsetse Controlled Areas [OAU/FITCA]), from

institutes in Botswana, Ethiopia, and Kenya, and from donor country organizations (the UK Natural Resources Institute and United States Agency for International Development [USAID]).

8. The draft conclusions and recommendations that resulted from that meeting represented a breakthrough in the co-ordination process. After many years of debate on this issue, a consensus was finally achieved on the approach to be followed, thus paving the way for united action. The concrete results achieved by the Agency through successful projects in the United Republic of Tanzania and the commitment expressed by all the governments such as Ethiopia were key elements in reaching this agreement. The major points agreed upon were the following: recognition of the area-wide concept for control of the tsetse and the fundamental requirement to use sterile insect techniques (SIT) for final eradication; acceptance of the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) Plan of Action, reflecting African leadership for solving the trypanosomosis problem and African ownership of the programme; and agreement that large-scale rearing facilities, situated in Africa and providing the necessary supply of sterile flies, are an urgent requirement for realizing the OAU Declaration on the eradication of tsetse. The Agency support to this Plan of Action has already attracted extrabudgetary funding from the Government of Norway and is expected to attract further extrabudgetary funding from other sources.

9. Several other regional African programmes are being implemented in partnership with regional and interregional organizations as well as donors. In the field of cancer treatment, close collaboration has been established with partners such as the European Society for Therapeutic Radiology and Oncology (ESTRO), the International Society for Radiation Oncology (ISRO), the OPEC Fund, and the Joint United Nations Programme on HIV/AIDS (UNAIDS). This collaboration covers the implementation of training events, the sharing of costs for certain radiotherapy equipment, as well as the adoption of harmonized approaches towards the handling of HIV-related cancer. The African Radiation Oncology Group (AFROG) is also actively involved in implementing the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) activities in the field of cancer management.

10. Another area where the Agency is building partnerships is communicable diseases. In December 2000, high-level officials from ministries of health, disease control programme managers, clinician and scientists from 18 Member States, and WHO and IAEA representatives met in Nairobi, Kenya, to share information on progress achieved, identify the needs of different countries, and agree on workplans for the coming years, including verifiable indicators in combating malaria and tuberculosis. WHO and the Agency are co-operating in the campaign against malaria and implementing joint activities so as to increase impact and sustainability.

11. In Asia, relations were strengthened during 2000 with the Economic and Social Commission for Asia and the Pacific (ESCAP) through the Agency participation at the annual ESCAP meeting held in Japan. ESCAP provides a forum to develop intergovernmental consensus on selected issues of regional concern, and at that meeting the Agency engaged actively in dialogue directed towards strengthening regional and sub-regional co-operation for addressing common environmental problems, promoting technology transfer, and information networking. Similar dialogue was initiated at the RCA Consultative Meeting on Enhanced Awareness and Co-ordination among International and Regional Organizations in the Asia and Pacific Region held in Dhaka, Bangladesh, March 2001, with organizations including the Global Environmental Facility (GEF), International Maritime Organization (IMO), South Asian Association for Regional Co-operation (SAARC), and United Nations Office for Project Services (UNOPS). The Agency is further strengthening its relations with the APO through a mutual agreement to exchange information and collaborate on the transfer of nuclear

technologies to small and medium industries. In addition, the Agency and APO are developing projects for joint implementation in Bangladesh, Indonesia, and Viet Nam.

12. Resolution GC(44)/RES/18 also requested the Director General to facilitate cost-sharing, outsourcing, and other forms of Partnership in Development by reviewing, amending, or simplifying, as appropriate, relevant financial and legal procedures. In the same vein, in December 2000 Member States asked the Agency to examine the possibilities of facilitating the acceptance of contributions from intergovernmental organizations and from non-governmental sources by amending the relevant Agency rules. The Secretariat has followed this up by examining the rules and procedures of other UN organizations and is now consulting with Member States on possible amendments to the Agency rules with the aim of finalizing this issue in 2001<sup>3</sup>.

### **3. Technical Co-operation among Developing Countries**

13. Resolution GC(44)/RES/18 requests the Director General to continue the Agency's efforts of working with Member States within relevant regional groups to refine outsourcing mechanisms in the context of enhancing Technical Co-operation among Developing Countries (TCDC) and to identify Regional Resource Centres<sup>4</sup> (RRCs).

14. Strengthening regional TCDC was the focus of special attention in Africa and included concrete actions aimed at optimizing, through AFRA activities, the use of available expertise and infrastructure in the region. Among these were the conditioning of radium sources by South African specialized teams based on cost-sharing, the introduction of improved managerial practices through outsourcing of activities to South Africa, and fully clearing four African countries from radium sources in 2000. The Agency and AFRA Field Management worked out modalities for outsourcing AFRA activities at a regional level.

15. At the interregional level, an AFRA initiative on dam safety brought together for the first time the Agency, consultants from Africa, Latin America, Southeast Asia, Europe, and East Asia, as well as international experts from the USA, South Africa, and Sweden to identify safety/risk assessment concepts and methodologies and to define practical uses for them before, during, and after dam construction in developing countries.

16. Regional TCDC has been strengthened through Agency projects for repair and maintenance of nuclear instruments. In Latin America, two such regional ARCAL projects involved 17 countries. Major achievements of these projects as of 2000 included the repair of 1,439 instruments, the successful designation of three new regional centres, bringing the total number of the centres in this field for the region to five, and the training of more than 250 technicians. These projects have proven extremely cost-effective in terms of the value of the equipment made usable again in comparison with the cost of repairing it. A similar project in the Asia region was reviewed in 2000 at a meeting in Hanoi, Viet Nam, and seen to be successful in both objectives of repairing nuclear instruments and training national staff. Capabilities for repair and maintenance are being transferred, in particular from institutes in Indonesia and Malaysia to other countries of the region.

17. Work has begun between the representatives of the three regions where regional agreements (African Regional Co-operative Agreement for Research, Development and

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<sup>3</sup> Amendments were presented to the June 2001 Board Meeting and accepted. See also GC (45)/9.

<sup>4</sup> The term "Regional Resource Centres" is used here. Other terms used in different regions to refer to the same concept include "Centres of Excellence", "Designated Regional Centres" and "Regional Resource Units".

Training Related to Nuclear Science and Technology [AFRA], Regional Co-operative Arrangements for the Promotion of Nuclear Science and Technology in Latin America [ARCAL], and Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology for East Asia and the Pacific [RCA]) have been concluded to develop regional web sites for information sharing and project data collection. Participants from the Member States and an expert from the Agency met in Buenos Aires, Argentina, to identify the issues associated with this technology and benefits from exploiting it. Each region has expressed interest in developing a web site to share information about regional projects, as well as to provide a link to national home pages. A feature of the RCA site and one that will be adopted by the other two regional sites will be a members-only area, in which links to the Agency TC-PRIDE system<sup>5</sup> will also be included.

### **Regional Resource Centres**

18. The introduction of the RRC programme in 1997 was seen by many Member States as having the potential of significantly enhancing TCDC; of increasing the sustainability of nuclear science and technology at a regional level; and of promoting greater "ownership" of projects by Member States; as well as being a cost-effective mechanism to implement project activities. This section of the report reviews progress made implementing the RRC approach between 1 April 2000 and 31 March 2001.

19. In the West Asia region, eight countries responded to the request for nominations and proposed 20 institutions in different fields as candidates for RRCs. The technical divisions in the Agency have reviewed and provided their appraisals to these proposals. A regional meeting of all countries that submitted proposals will be held in June 2001 to examine the institutions according to an agreed set of criteria. That meeting will decide on a list of recommended centres that will be submitted to all the countries of the region for consideration and final approval.

20. In the Africa region, four Regional Designated Centres (as RRCs are known there) were designated in 2000 in the fields of radioactive waste management (South Africa), non-destructive testing techniques (South Africa and Tunisia), and radiation oncology (South Africa). This recognition was carried out according to an agreed set of procedures adopted by AFRA Member States for the pre-selection, auditing, and appointment of Regional Designated Centres. Two other candidate centres were advised to improve certain technical and/or managerial aspects before recognition could be considered. In the field of biotechnology and mutation breeding, one regional centre has been pre-selected and will be audited in 2001. Detailed workplans and operational modalities were prepared for each recognized centre.

21. RRCs are known as Regional Resource Units (RRUs) within RCA. Six RRUs were designated in the RCA region in 2000, bringing the total of the region to 34 in 12 Member States, of which 18 are in developing countries. They cover a wide range of areas, such as electronic networking, development of distance learning material, tracer studies, environmental databases, and a variety of nuclear and isotope techniques.

22. In Latin America, a total of 24 RRCs have been officially recognized under the ARCAL programme. The region now has five RRCs fully operational under two ARCAL projects on Calibration of Radiotherapy Dosimetric Instrumentation and Training and Repair of Nuclear Instrumentation.

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<sup>5</sup> For an explanation of TC PRIDE, see below, paragraph 42.

23. In Europe, the situation of the RRCs remained stable in 2000, following the same approach as in 1999. The Jozef Stefan Institute in Slovenia hosts many training events, workshops, and meetings for the region every year. The training centre at the Paks Nuclear Power Plant in Hungary has developed a model of Systematic Approach to Training which is of interest to many water-cooled and water-moderated reactor operators both within and outside the region. The Slovak Nuclear Regulatory Authority plays an important role in the regulatory sector, and the Nuclear Research Institute in Řež, Czech Republic, is an RRC for water-cooled and water-moderated reactor pressure vessel technology.

#### **4. Least Developed Countries**

24. Resolution GC(44)/RES/18 emphasizes that programmes should contribute to the achievement of national goals for sustainable development in developing countries, and particularly in least developed countries (LDCs).

25. The programme designed in 2000 for the coming biennium devotes more resources than in previous biennia to technical co-operation in LDCs. The core national programme for LDCs prepared for 2001-2002 was \$11.6 million, an increase of 12% over the \$10.3 million approved for 1999-2000. In recognition of the fact that 14 of the 19 LDC Member States are located in Africa, it was decided in 2000 to increase the share of the core technical co-operation programme for the coming biennium for Africa to 25.3%, compared with 23.9% for the previous biennium. This meant that the programme prepared for Africa for the 2001-2002 biennium was \$33.3 million, a 14% increase over the \$29.2 million for the previous biennium.

26. A major characteristic of the technical co-operation programme carried out in the year 2000 was the continuing trend towards integration with major national development plans and activities. This was particularly true in LDCs, where the Agency applies nuclear techniques to attacking the roots of poverty by helping countries overcome barriers to development. For example, obtaining access to sufficient water resources is a critical issue in the development plans of a large number of LDCs, particularly in Africa. The Agency can play a significant role in addressing this issue using isotope hydrology techniques, because they provide indispensable tools for water resources assessment and development when appropriately used in an integrated manner with other hydrological methods. Several projects were started using isotopic techniques for improved groundwater utilization through artificial recharge and effective management of aquifers, as well as for improving urban hydrology.

27. One outstanding example is the programme in Ethiopia, which began with activities in geothermal studies and localized groundwater assessment and eventually created an awareness on the part of the Government of Ethiopia of the importance of taking a comprehensive approach to water resource management, including the use of isotope hydrology as a standard tool. (For a more detailed description of this programme, see the section on Africa in Part II of this document.)

28. Additional water resource projects in LDCs include two initiated by the Agency in 2000 in Mali, one to apply isotope hydrology in combination with other techniques for the assessment of available groundwater resources and one using isotope techniques in sediment dynamics investigations. Another example, included in the Country Programme Framework of Niger, which suffers from a serious drinking water shortage, supports hydrogeochemical and isotopic studies of a multilayer aquifer and assessment of the water resources in the Zinder region.

29. A severe constraint to the socio-economic development of LDCs, particularly the development of the agricultural sector, can be seen in animal diseases. In poor countries such as Myanmar, buffalo and cattle provide not only milk and meat but also draught power on farms, in timber production, and for rural transport. One of the major diseases is foot and mouth disease (FMD), which has severe economic effects on the rural population because it weakens animals, can be fatal for young animals, and prevents their use for draught power. Hence, measures to stop FMD are vital for improving the economy. A Model Project in Yangon has been successful in supporting the establishment of a well-equipped laboratory and training its staff, and in 2000 it made great improvements in the manufacture of vaccines against FMD. The project has maintained the commitment of the Government to combat FMD, resulting in the establishment of a new laboratory, as well as the renovation of the existing laboratory using national funds. Again, the impact extends beyond the project itself as the laboratory is well equipped to handle work generated by other aid agencies in Myanmar.

30. An innovative project for African LDCs, which began in 2000, uses new information and communication technology (ICT) to develop and deliver learning/training modules as required by the individual countries. These modules help LDCs to strengthen and expand their capacity to make use of specific nuclear technologies critically needed in key development projects/programmes supported by the Agency and other donor partners. The areas covered include pest control, animal diseases, nuclear medicine, nuclear instrumentation, and radiation oncology.

## **5. *Understanding the Marketplace for Nuclear Technology***

31. The need to understand the marketplace for nuclear technology and to develop mechanisms and best practices for working with the private and the public sector is also emphasized in resolution GC(44)/RES/18.

32. In many countries, nuclear institutions have already adopted an active approach towards achieving greater self-reliance and sustainability, re-orienting their policies and re-organizing technical and managerial structures. Some institutions have acquired expertise across the whole spectrum of the nuclear field and have given rise to industries in areas ranging from nuclear energy to nuclear medicine. However, many institutions still face a difficult transition and need to undertake more aggressive initiatives to ensure their continued viability. Towards this end, a Regional Seminar on Strategies and Approaches towards Self-reliance and Sustainability of National Institutions was organized in Kuala Lumpur, Malaysia, in August 2000. The objectives of the seminar were to raise awareness among Member States of the need to be more self-reliant in order to sustain the relevance of the nuclear institutions to national development; to analyze recent changes in the national science and technology policy affecting the management of nuclear institutions; to examine case studies of successful or promising initiatives in various fields; and to use those case studies to identify ways to re-direct and re-orient activities in the field of nuclear technology so as to enable institutions to achieve greater self-reliance and sustainability. As a result of this seminar, the Agency is assisting individual Member States with the preparation of national action plans. The Agency initiative attracted great interest among Member States, in particular because many nuclear institutions realized that such efforts are necessary to preserve and further develop nuclear expertise into the next generation.

33. In Africa, the upstream work carried out in 1999 for the design, formulation, and implementation of concrete strategies aimed at securing self-reliance and sustainability of nuclear research institutions through income generation and introduction of reforms materialized in 2000, when a full theme on this subject was approved under the AFRA

programme. Particular emphasis has been placed on the creation within Africa of a market for services and goods in the field of nuclear science and technology, as well as the consolidation of achievements attained by nuclear institutions in some African countries. Special assistance was provided to AFRA Member States to help them establish their national strategic plans in the field of public relations, fund raising, marketing, and customer relations. This included training workshops for Public Relations Officers as well as expert services for individual countries. So far, 11 AFRA countries have finalized their national strategic plans.

## **6. Mitigating Greenhouse Gas Emissions**

34. Resolution GC(44)/RES/18 requests the Director General to help interested Member States (a) to obtain access to relevant information on the role of nuclear power in mitigating greenhouse gas (GHG) emissions, guided by the objective of sustainable development; and relatedly (b) to implement national case studies, and (c) to prepare potential projects.

35. In accordance with this request, the Agency has promoted information dissemination and increased public awareness on the status of nuclear power in the international debate regarding the Kyoto Protocol and eligible Clean Development Mechanism (CDM) technologies. It established a steering committee on CDM to co-ordinate and supervise the implementation of the Agency's CDM-related activities under technical co-operation projects and activities funded by the regular budget.

36. In 2000, the Agency assisted interested Member States in carrying out national case studies on the CDM and nuclear power in China, India, Pakistan, Republic of Korea, and Viet Nam. The studies explored the potential role for nuclear power as a CDM technology in specific country situations. The Agency also organized a number of regional workshops and training courses for the implementation of the national case studies, and the results of the studies were presented at side events of the IAEA 44<sup>th</sup> General Conference and the sixth session of the Conference of Parties to the United Nations Framework Convention on Climate Change (The Hague, 13 - 24 November 2000).

37. In response to requests from interested Member States in connection with the implications of flexible mechanisms under the Kyoto Protocol, two new regional projects for 2001-2002 were designed for the Asian and European regions on CDM and Joint Implementation (JI). These projects will focus on assisting Member States in building improved capacities for conducting GHG abatement studies and assessing the potential role of nuclear power under the CDM/JI provisions of the Kyoto Protocol.

## **7. Financial Resources**

38. In resolution GC(44)/RES/18, the General Conference requested the Director General to continue to take account of its views when requesting Member States to pledge their respective shares of the Technical Co-operation Fund (TCF) targets. The resolution also urges all Member States to make every effort to pay their voluntary contributions to the TCF in full and on time and reminds Member States of their obligation to pay their Assessed Programme Costs.

39. Member States devoted considerable attention to the question of payment of contributions to the TCF during 2000. Following intensive negotiations, the governing bodies maintained the TCF target for the years 2001-2002 at \$73,000,000 per year. They also introduced a new principle, the "rate of attainment", which measures the ratio of total

voluntary payments to the TCF against the TCF target for a programme year. It was decided to set the minimum rate of attainment at 80% for 2001 and 85% for 2002. By way of comparison, as of the end of February 2001, the rate of attainment for the year 2000 was 78.4%. It is expected that the introduction of the rate of attainment will increase the resources for the TCF by encouraging those countries not paying their full assessed share to pay at least the amount corresponding to the rate of attainment. It is still too early to judge the effects of this approach, but the first reactions from Member States are promising.

40. The principle of "due account", which aims at encouraging Member States to pledge and pay their full shares of the TCF as well as encouraging recipient countries to pay their outstanding Assessed Programme Costs, was launched in September 1995. In early 2000, the Secretariat revised due account methodology and made it more transparent, establishing precise criteria for evaluating the payment record of Member States. In discussions during the summer of 2000 and in meetings with Member States during the 44<sup>th</sup> General Conference, due account provisions were stressed, and they were used, judiciously and cautiously in the final allocation of the 2001-2002 programme as a separate process after national programmes had been formulated. Member States that qualified as excellent contributors received more programme than originally planned, and those that were categorized as poor contributors received less. Although it is more difficult to apply due account to donor countries, the Secretariat is striving to do so, in accordance with the relevant General Conference decisions.

41. Encouraging progress was made in 2000 towards Member States fulfilling their financial responsibilities. A number of Member States with significant arrears paid sizeable contributions towards outstanding amounts, so that the total arrears for Assessed Programme Costs was reduced in the year 2000, reversing the outcome of the previous year. Furthermore, the voluntary contributions to the TCF were higher than any year except 1999, which had been an exception due to the payment by a major donor of an amount greatly in excess of the target for that year. The Secretariat will continue to keep Member States apprised of their due account category and encourage them to pay both the expected voluntary contributions as well as any outstanding Assessed Programme Costs.

## **8. *Strengthening Technical Co-operation through Greater Outreach and Improved In-house Co-ordination***

42. Outreach activities focused on the use of modern information technology tools to raise awareness of technical co-operation activities with the public at large, and to improve information sharing on technical co-operation projects with Member States. A new and detailed section on the technical co-operation programme - the **TC Web** (<http://www-tc.iaea.org>) was released in June 2000 as part of the Agency's WorldAtom site. In addition to giving the latest technical co-operation news and highlights, the site presents the Department of Technical Co-operation and its structure, the technical co-operation programme's history and strategy, and provides summary information on technical co-operation projects. Also, the Technical Co-operation Project Request Form, the application forms for technical co-operation Fellowships, Scientific Visits, Training Courses, and the Personal History Form for experts are available and can be retrieved by interested users. The web-based Technical Co-operation Project Information Dissemination Environment, or **TC-PRIDE** (<http://www-tc.iaea.org/tcpride>), a restricted site not available to the general public, was released to Member States on the occasion of the 44<sup>th</sup> General Conference. Providing comprehensive information on technical co-operation projects down to a very detailed level, TC-PRIDE has become an invaluable tool, especially for project managers, technical officers, and Member States' representatives, for information sharing, monitoring project implementation, and

decision-making. Further enhancements to the system are planned in order to expand its usefulness.

43. In 1999, the Secretariat put in place a set of Management Principles<sup>6</sup> governing the formulation and implementation of the technical co-operation programme in an effort to reinforce matrix management and synergy between the different Departments involved in the programme. In the context of these principles, a pilot exercise was organized in 2000 in which staff of Technical Departments were nominated as Project Responsible Officers for a number of projects. The exercise ran smoothly, and initial findings show that while it has contributed to increased awareness of matrix management and to the further codification and implementation of best practices in project management, it did not, as a by-product, result in any significant savings of workload for either the Department of Technical Co-operation or the Technical Departments.

## **9. Lessons Learned from Evaluation**

44. A key feature of accountability is the evaluation of and regular reporting on the achievements of the technical co-operation programme. The Agency reports annually to the Technical Assistance and Co-operation Committee and the Board on its technical co-operation evaluation activities. In order to make the evaluation of technical co-operation a more independent function, thus increasing transparency, the Director General decided at the end of 2000 to change the reporting structure. Under this structure, the Evaluation Section remains within the Department of Technical Co-operation, but evaluation reports are directed through the Office of Internal Audit to the Director General rather than being addressed to the Deputy Director General for Technical Co-operation. More recently, a decision was taken to increase the independence of the Evaluation Section further by integrating it fully into the newly created Office of Internal Oversight Services. This will take effect in January 2002.

45. The evaluation report for 2000 comprises the document GOV/INF/2000/25, issued 9 November 2000. The document contains lessons learned that have relevance for the technical co-operation programme extending beyond the specific thematic areas evaluated and which are highlighted below.

46. A common theme of the lessons learned from the evaluations carried out in 2000 is that project success at the outcome level depends heavily upon strong commitment, not only on the part of project counterparts, but also of central government authorities. Clearly defined and committed end-users are key to ensuring that the technology, once transferred, produces results. An example of this is in radioactive waste management, where there is uneven attainment from country to country of the overall goal of establishing a fully functional nation-wide system for the safe collection, storage, and disposal of radioactive waste that is backed by sound legislation and regulatory practices with adequate and predictable funding. Lack of progress towards this goal was usually associated with inadequate Government funding, missing legislative framework and regulatory authority, or lack of management capacity. Therefore, it is important that projects include awareness building for decision makers to create commitment to continue support for project objectives.

47. Another lesson learned in the course of this evaluation that has implications for a wide range of Agency technical co-operation activities is that the Agency should ensure that nuclear science and technology applications are used only under circumstances when adequate radioactive waste management is in place. Radioactive material should be provided, or its acquisition encouraged, only when there is good assurance that the inherent

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<sup>6</sup> Outlined in an internal document available from the Secretariat

waste it generates can be collected, handled, and disposed of safely. The important management steps that have been taken to help Member States to comply better with international Basic Safety Standards in radiation protection should be followed throughout the waste management programme as well.

48. A final lesson learned in 2000 that should be more widely applied is the importance of ensuring that projects are designed in a holistic, comprehensive way, avoiding a piecemeal approach or the traditional incremental approach that is linked to the two-year programme cycle. In order to ensure transparency and accountability, such an approach will continue to require solid upstream work to define clearly expected results, combined with the willingness to communicate modifications made to project workplans in order to achieve those results. A review of Model Projects revealed two factors that strongly favor this type of planning and budgeting. Those factors are the results-based management approach adopted by the Agency and the realization that appraising and managing large numbers of small projects puts increased pressure on already limited staff time.

## **10. Constraints and Shortcomings**

49. As reported in Section 2, the Agency continues to consult and interact with organizations of the UN system and other bodies in order to co-ordinate and co-operate in development activities. Despite its efforts, however, this often proves to be difficult at the field level. In particular, the Agency has attempted to follow the requests of its governing bodies to be involved in the Common Country Assessment/United Nations Development Assistance Framework (CCA/UNDAF) process in those countries where it is being undertaken. Due in part to the fact that the Agency does not have field representatives, in most countries the Agency is not part of the UN Country Team, and although the Secretariat has been successful in participating in the CCA process in some countries, that has not always been the case. In those countries where it has not been able to participate, Agency technical co-operation projects are not included in the UNDAF, making it more difficult to create synergies and profit from complementarities. National liaison offices could help ameliorate this difficulty by taking a more proactive stance with those authorities within their own countries - including the UNDP - involved in the CCA process.

50. A continuing constraint is the weak links in certain recipient countries between nuclear institutes and end users (including key ministries such as health, agriculture or natural resources) as well as with central government authorities. Where these links are weak, it is difficult for the Agency to ascertain properly priority development needs and for the institutes themselves to attract the government commitment necessary for sustainable results. The application of the central criterion (i.e. strong government commitment with evidence of significant financial support) in the project screening process is designed to help encourage nuclear institutes to build the necessary linkages.

51. Despite its effort, the Agency has not always been successful in raising awareness among national development planning authorities about the possible applications of nuclear technology in solving developmental problems. Furthermore, in their interactions with other intergovernmental organizations and bilateral donor agencies, Agency staff members are frequently told that those organizations are not aware of the Agency's technical co-operation activities and of the many potential uses of nuclear applications in development. This is a problem that the Agency is striving to solve with many of its outreach activities, but it is evident that greater efforts in this direction are needed.

52. A further constraint, which has been noted by the Board of Governors, is the increased pressure on the human resources of the Department of Technical Co-operation. The growing size of the technical co-operation programme, the increasing number of recipient

countries, and the increasingly labour-intensive process of upstream work and programme development has led to a growing burden of work on the staff. To date, the Secretariat has dealt with this by introducing improvements in information technology, by simplifying procedures, and by asking more of its staff. As noted in Section 3, the Secretariat has also made efforts towards outsourcing technical co-operation activities, which can have the added effect of promoting TCDC. The process of outsourcing also faces constraints, both internal and external, and experience to date has not shown that it reduces the amount of work required for project implementation. Improved policies and procedures are being developed to overcome these difficulties. However, all of this has not been enough to solve the workload problem. Recognition of the seriousness of the problem led the Board of Governors to decide, as an exceptional measure, in December 2000 to approve an amount of up to \$1 million from the TCF to finance additional human resources to assist in managing the Technical Co-operation programme for the next fiscal year and requested the Director General to look into various options for a medium and long term solution in consultation with Member States. It is hoped that additional financing will help relieve somewhat the pressure on staff for a good and rigorous management of the expanding Technical Co-operation programme.

## PART II: TECHNICAL CO-OPERATION PROGRAMME MAJOR ACHIEVEMENTS

### 1. Africa

53. The year under review led to achievements both in terms of programme delivery and upstream work for the 2001-2002 cycle. Continuing the trend of previous years, the level of new obligations in the region reached over \$16 million, which represents an increase of about 9% compared with 1999.

54. Consistent with the TC Strategy, efforts were continued to develop Country Programme Frameworks (CPFs). During 2000, Libyan Arab Jamahiriya, Morocco, Namibia, Senegal, and Tunisia were involved in the CPF process. The outputs from the CPF exercises conducted in 2000 (as well as from previous years), in conjunction with the use of the Model Project criteria, provided valuable guidance that formulated the programme for 2001-2002.

55. A regional training workshop on Project Design and Formulation was organized in 2000 as part of the upstream work for the preparation of the technical co-operation programme for 2001-2002. This workshop was attended by 33 participants from 22 countries and was held in order to maximize the impact and usefulness of the training workshop for project design that had been held in 1999. The presentations enabled participants to gain a better understanding of the Agency's requirements with regard to technical co-operation projects. They also set the stage for meaningful discussions on, and subsequent modifications to, the design and formulation of specific project proposals. Thirty-one project proposals were discussed and consolidated. More particularly, elements for the elaboration of the project framework matrix and the workplan were provided, and recommendations to improve project design and formulation were proposed. Subsequently, the recommendations for consolidation and improvement of specific project proposals were followed up by the national authorities. The results of this exercise were taken into account during the appraisal of these project proposals. This workshop is one example of the work the programme accomplished to improve project proposals, thus reducing the number of project proposal submissions.

56. The General Conference (GC(44)/RES/3) approved the application for membership of the Central African Republic in 2000, subject to completion by Central African Republic of the ratification process required by the Agency's Statute, bringing the future total number of TC recipient states in the region to 31.

### Water Resource Management

57. There is wide recognition within the region of the important role isotope hydrology techniques play in water management projects. The achievements recorded in some countries have contributed to increasing institutional awareness, which consequently promoted great interest and ownership of technical co-operation activities by national stakeholders.

58. A two-phased approach was used under Model Project *RAF/8/022—Isotopes in Groundwater Resources Development* to establish isotope hydrology techniques for the management of water resources in the region. Phase I began in the mid 1990s in Egypt, Ethiopia, Morocco, and Senegal (1995-1998). In 1997, Algeria, Mali, Niger, Nigeria, and Sudan joined the project and began Phase II. In **Algeria**, the project results provided critical data for the sustainable management of the aquifer in the Tin Serrine Basin, which is of utmost importance for the water supply of Tamanrasset town. In **Mali**, the isotope studies of

the unconfined aquifers within the Gondo Plain, where most of the wells used for water supplies were drying up as a result of the drought in the 1970s, will serve as a guide for locating new wells. The isotopic data of the aquifer systems in the Dallol Maori Valley in **Niger** showed that the rapid infiltration rainfalls into the shallow aquifer are an indication of sustainability of the resource, but at the same time also a threat for the water quality. In **Nigeria**, the study provided critical data for determination of the various sources of recharge and mechanisms involved in the replenishment of the Rima Group aquifers. This information will enable the end-user (Federal Ministry of the Water Resources) to appreciate the impact of Fadama irrigation on the project land and groundwater. The isotope study in **Sudan** provided useful data on the Nile water contribution to the Nubian aquifer system as well as some indication about the relationship between the shallow and deeper aquifers along the Wadi El-Muggadam and Dongla area, which can be used to improve the management of the water resources for about 2.5 million people who were displaced towards the Nile banks by recent droughts.

### Small Projects Lead to Big Developments

Based on the experience acquired and infrastructure established in Africa, several African Governments are committed to investing funds and sought collaboration with the Agency to improve the quantity, quality, and sustainability of groundwater resources in their countries. The water resources management project in **Ethiopia** exemplifies the unique role that isotope hydrology can play when linked to the national development programmes in this field. Isotope hydrology started with a few activities in geothermal studies and localized groundwater assessment in Ethiopia. A National Isotope Hydrology Training Workshop held in 1993 with Agency support kicked off isotope hydrology activities in the country. Early results were particularly useful in characterizing the Aluto Geothermal Field, through which the United Nations Development Programme (UNDP) and European Economic Commission (EEC) funded a 7.2-MW pilot power plant. During the course of the following years, efforts ensured that the Ethiopian Electric Power Corporation (EEPSCO) adopted isotope hydrology techniques as a regular management tool. The culmination of these efforts was the tripartite meeting held between EEPSCO, the Geological Survey of Ethiopia (GSE), and the Ethiopian Science and Technology Commission (ESTC) in December 2000. As a result of this meeting, the three institutions entered into a memorandum of understanding to solve the reservoir-related operational problems of the power plant. The contribution of isotope hydrology techniques through *ETH/8/006—Isotope Techniques for Water Resources Management* resulted in the understanding of water-level problems in Lake Beseka and indicated that the main reason for the rise in the level of the lake was the flow of groundwater through fissured geological structures, thus paving the way for remedial measures to be undertaken by the national authorities. The investigation using isotope techniques on Lakes Awassa and Akaki has already started. Encouraged by these results, the Government of Ethiopia requested the Agency to assist in the preparation of the multi-year Ethiopian Groundwater Resource Assessment Programme (EGWRAP).

59. Being one of the driest countries in sub-Saharan Africa, **Namibia** holds management of water resources as a high priority. The ephemeral nature of the rivers and the irregular dispersal of precipitation in the country necessitates appropriate water resource management using flow-rate measurements to assess flow volumes and the dynamics of surface and groundwater for the calibration and refinement of water-balanced mathematical models. Under the Agency's technical supervision, a subcontract was awarded to CEDEX, Spain, through Model Project *NAM/8/003—Automatic Tracer Flow Gauging Stations in Ephemeral Rivers* to design, assemble, calibrate, and test a pilot station for gauging the flow rate of ephemeral rivers using artificial tracers. The use of this system will enhance the quality of river flow information, which is a prerequisite for technical, economical, and environmental evaluation and optimal exploitation of the country's water resources.

## Food and Agriculture

60. Date palm plays an important role in the economics and social life in the North African countries. **Algeria** and **Tunisia** export about 10,000 and 15,000 tonnes per year, respectively, at an average of \$16,000 per tonne. The spread of Bayoud disease has become a trans-national problem in North Africa which requires an area-wide approach. *RAF/5/035—Control of Bayoud disease in Date Palm* has succeeded in achieving the characterization and isolation of the fungal toxin and the development of short- and long-term strategies to control the spread of the fungus and to breed disease-resistant varieties using radiation-induced mutants.

61. The research needed to combat Bayoud disease requires a large number of irradiated plants based on the in vitro culture method. Because only one or two male trees are needed for pollination for every 50 female trees, it is the multiplication of the high-quality female trees which is critical in date palm improvement. Recently, there has been a significant breakthrough in the in vitro regeneration of the date palm. A new technique has been developed by a Tunisian research team in Sfax to regenerate plants from embryogenic cultures, which can yield as many as 100 plants per cubic centimetre of callus. The cost of plantlets produced this way is estimated at \$4/plant, while the commercial price of a traditional variety costs about \$30/plant with no guarantee of it being disease-free or a high-quality female plant. This technique is expected to revolutionize both the multiplication of date palm as well as the recovery of mutants in large numbers. The regional project has thus turned into a highly interactive and synergistic co-operation to tackle Bayoud disease.

62. Another regional obstacle to food and agriculture production in sub-Saharan Africa is tsetse fly infestation and trypanosomiasis. During the year 2000, a number of activities took place related to the IAEA's support to the efforts of African Member States in the field of tsetse fly and trypanosomiasis management. Activities, ranging from expert missions and training to provision of equipment and meetings, were carried out within the framework of the Organization of African Unity (OAU)-IAEA Co-operation Agreement in the context of *RAF/5/040—SIT for Tsetse and Trypanosomiasis Management in Africa* with the objective of promoting the use of the sterile insect technique (SIT) in an integrated area-wide approach to create tsetse-free zones.

63. The IAEA supported and facilitated the Regional Training Course on the Sterile Insect Technique as a Component of Integrated Area-wide Tsetse and Trypanosomiasis Management held in March 2000 in Tanga, **United Republic of Tanzania**; the convening of a meeting to inaugurate the Pan African SIT Forum, a forum intended to promote and advance the use of SIT; and a consultative meeting between a high-level delegation from the OAU Secretariat and representatives of the IAEA to discuss proposals for the implementation of the decision by the African Heads of State on tsetse eradication. Representatives from the Governments of **Mali** and **Burkina Faso** and the Agency held a meeting in order to finalize the modalities of a tripartite agreement for the implementation of a tsetse eradication project in Bamako, Mali, using sterile male tsetse flies produced in Burkina Faso.

64. The IAEA also supported and facilitated the deliberations of a Task Force of experts to prepare the Concept and Plan of Action for the Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) (for details, see Part I of this document). Within the framework of the agreement for strategic co-operation between the IAEA and the OAU, and in support of the PATTEC initiative, the IAEA recruited a regional expert and seconded his services to the OAU to help organize the work of initiating and managing the PATTEC. Programme resources allotted from the Technical Co-operation Fund for tsetse-fly-related projects in 2001-2002 amount to about \$4 million.

65. In **South Africa**, fruit flies pose a great threat to the deciduous fruit industry. A major achievement was the successful implementation of a fruit fly SIT pilot project in the Western Cape province. As a result of replacing insecticides with aerial releases of sterile males, fruitfly populations were effectively suppressed throughout 2000 in the Hex River valley, a

major table grape exporting region. Because of this project, the number of boxes of table grapes from this valley rejected by importing countries was reduced by 60%, representing a substantial increase in revenue to the fruit industry.

### **Animal Disease Control**

66. Past IAEA programmes (both through the IAEA technical co-operation programme and through FAO/IAEA Co-ordinated Research Programmes) have supported scientists in Africa to improve their capability to diagnose, conduct surveys, and monitor the effectiveness of control and eradication programmes against the major diseases affecting livestock. One of the larger programmes the Agency has participated in the Pan African Rinderpest Campaign (PARC) led by the OAU.

67. In co-ordination with OAU/Inter-regional Bureau for Animal Resources (IBAR), expert missions were arranged by the Agency to assist **Burkina Faso, Côte d'Ivoire, and Senegal** with the preparation of information to be submitted to the Organisation Internationale des Epizooties (OIE) in support of an OIE Recognition of Freedom from Rinderpest. With extrabudgetary support from the US, a co-operative programme backstopped by the International Laboratory of Molecular Biology (ILMB) for Tropical Disease Agents, University of California, Davis, was initiated in 2000 to transfer the production of biological reagents needed to sustain animal disease diagnosis to national laboratories. The aim of this programme has been to develop a capability for producing a diagnostic kit to detect rinderpest antibodies that meets the needs of rinderpest surveillance sufficient to enable Member States to complete the OIE Rinderpest Pathway. One important objective related to the IAEA assistance is to facilitate the introduction of a rinderpest vaccine.

68. Unfortunately, rinderpest is not the only infectious disease affecting the livestock of Africa. Contagious bovine pleuropneumonia (CBPP) and African Swine Fever have both crippled the livestock industry in Africa. Recognizing the critical role that IAEA had played to date in assisting OAU/IBAR in the control of such diseases, OAU sought a partnership with IAEA. In 2000, a new OAU/IBAR programme commenced called Pan African Programme for Control of Epizootics (PACE). A focus of this collaboration was for the Agency to assist the PACE programme through support for laboratory and related activities. PACE is primarily funded by the European Community and will create effective and sustainable epidemiological surveillance units throughout sub-Saharan Africa to ensure that subsequent outbreaks of disease can be quickly identified and curtailed. By reducing or eliminating the risk of such devastating disease, counterparts hope that livestock producers will be able to focus on increasing productivity and contributing to the clear need for a food secure environment in this part of the world.

### **Human Health**

69. As part of the continuing effort to combat the resurgence of drug-resistant tuberculosis (TB) and malaria, a regional planning meeting took place in December 2000 in Nairobi, Kenya. The malaria part of the meeting was co-sponsored by the WHO's Special Programme for Research and Training in Tropical Diseases (WHO/TDR). The development objective pursued by the Agency has been to seek partnerships to establish the conditions for integration of these techniques as advanced decision-making tools in the protocols of national control programmes for malaria and TB to counter the spread of drug-resistant strains of pathogens of epidemiological significance.

70. Maintenance of medical instruments resulted in cost savings for Member States. Using electronic cards developed by Cuban, Indian, and Slovenian institutions to enhance the performance of gamma cameras through the introduction of single photon emission computed tomography (SPECT) systems and other advanced features, the AFRA project *RAF/4/014—Maintenance of Medical and Scientific Instruments (AFRA IV-3)* has successfully

upgraded 17 gamma cameras, i.e., five in **Egypt**, three in **Morocco**, three in **South Africa**, and one each in **Ethiopia**, **Ghana**, **Kenya**, **Sudan**, **Tunisia**, and **Uganda**. The upgrading resulted in the following benefits:

- more advanced clinical studies, e.g., dynamic studies for kidney and heart;
- improvement of gamma camera performance with modern correction technology and fast advance of PC technology;
- large cost savings, e.g., about one-tenth of the cost of commercially available nuclear medicine computer systems which cost about \$50,000-\$70,000; and
- prolonged lifetime of old gamma cameras for another 5-10 years of service.

71. Under the same project, three gamma cameras in Kasr El-Aini Hospital, Cairo, were rehabilitated and accepted for routine clinical studies. The results were reported during the last congress of nuclear medicine in **Egypt**.

72. A newly developed device for upgrading semi-digital gamma cameras was successfully tested in **South Africa** in October 2000. It is estimated that about 30 semi-digital gamma cameras could be upgraded with such a device in the region within two to three years' time.

#### **E-mail Assists in Medical Instrument Repairs**

Under an AFRA project, 15 African maintenance institutions were linked together to form a regional e-mail network in the field. This network is operated from the IAEA Seibersdorf laboratory and is also connected to several similar institutions in Europe. The purpose of this initiative is to enable repair and maintenance engineers to (i) exchange information and views about repair problems they are facing, (ii) help each other during investigation of defects on important equipment, and (iii) to benefit from the expertise of more advanced institutions.

The Agency provided some countries with computers and accessories as well as information on the use of the network. This new network between the repair and maintenance engineers contributed to the repair of a large number of instruments (more than 700 pieces of equipment), better services provided to end-users, reduction of machine downtime, as well as reduction of the maintenance costs. As a second step, it is envisaged to help with the introduction of Internet facilities so that the institutions can expand the scope of their activities and improve even more the services to end-users. The same services from Seibersdorf will be offered to the institutions in ARCAL and RCA as well.

#### **Radiation Protection**

73. Under the Model Project *RAF/9/024—Upgrading Radiation Protection Infrastructure*, all participating countries progressed in the establishment of their national inventory of radiation sources using the Regulatory Authority Information System (RAIS) provided by the Agency in terms of software and related training, but it appears that in several countries the systems still need to be updated to include spent or unused sources. While 11 countries have a radiation protection law in force or are in the final stage of its promulgation, only four of them enacted regulations which follow the principal requirements of international Basic Safety Standards (BSS). Four Member States fully attained milestone 1. There is significant

progress to report in establishing individual monitoring systems for occupationally exposed personnel in 13 countries. The shortage of qualified experts and trained human resources was the main bottleneck to Member States achieving milestones 1 and 2.

74. Six regional training events and seminars on various aspects of radiation protection were held under *RAF/9/024*, as was the *Regional Post-graduate Course on Radiation Protection* under *RAF/9/026*. During 2000, assistance in establishing radiation protection infrastructure was provided under Programme Reserve national projects for two countries that recently joined the Agency, **Angola** and **Burkina Faso** (*ANG/9/002* and *BKF/9/002*).

## **2. East Asia and the Pacific**

75. The East Asia and the Pacific region worked during the past year to use resources within its own region to assist its Member States achieve their goals to be sustainable and be self-reliant, i.e., Technical Co-operation among Developing Countries (TCDC). One example of this is a partnership between India and Sri Lanka. The two countries agreed to work together to bring Sri Lanka's radiation protection capabilities to a level where Sri Lanka could provide services in a more sustainable manner. India is providing the guidance and will supply the technology. The region is looking into brokering other pairings as well.

### **Food and Agriculture**

76. Countries in the region are dependent on agricultural productivity, the most important crop being rice, the staple food of the region. Through technical co-operation projects, some of the problems related to agriculture are minimized and/or resolved.

77. The Malaysian livestock farmers have suffered from infestation of old world screwworm (OWS), which has resulted in an annual loss of more than \$0.4 million. As a result of a feasibility study on the control and eradication of OWS through sterile insect technique (SIT) under *MAL/5/023—Eradication of Old World Screwworm Through SIT*, counterpart staff completed a field study on OWS incidences and economic losses due to OWS, as well as a cost-benefit analysis of an eradication programme using SIT. Also under the project, a pilot test using SIT against OWS in March - July 2000 demonstrated the technical feasibility and potential role of SIT. Although an eradication programme would not be justified in economic terms with present livestock numbers in **Malaysia**, the results of the project will contribute to the future decision making as the Malaysian Government has an ambitious plan for the expansion of livestock production.

78. In **Viet Nam**, Model Project *VIE/5/014—Rice Mutant Varieties for Saline Land* demonstrated the use of nuclear techniques for the development of the advanced mutant variety "TNDB 100", which has been more successful in producing improved characteristics than its parent variety TN. These improved characteristics of TNDB 100 provide a much higher yield of 6.8 t/ha as compared with 4-5 t/ha for TN; have a shorter maturity period of 95-100 days instead of 180-200 days; reduce plant height to 95-100 cm as compared with 180-200 cm; and grow two to three crops per year, whereas TN has only one crop per year. TNDB 100 has improved grain quality with better resistance to diseases and pests, thus making it suitable for the export market.

79. Similar to the above project, **China** initiated *CPR/5/013—Induced Mutation to Improve Rice Quality* in 1999. Large-scale extension to the end-user of new mutant varieties with improved quality was accepted with significant results. The counterpart officially released to the end-user three new varieties and several sterile lines with mutated leaf color marker. In addition, several very elite lines with superior quality were successfully selected through marker-aided selection. Also in China, *CPR/5/014—Increasing the Productivity of Crop/Livestock Production System* established the use of urea-molasses multinutrient block

(UMMB) as an emergency feed during winter. The UMMB was also a vehicle for delivering anthelmintics which combat parasites in cattle, yak, goat, and sheep. The project also helped in the management of manure to increase the production of oats, barley, and pasture feed, which leads to a reduction in the consumption of chemical fertilizer.

80. In addition to the project in China on UMMB, there is a regional project helping ten Member States to develop UMMB based on locally available feed resources (*RAS/5/035—Improving Animal Productivity and Reproductive Efficiency*). The project completed on-site and on-farm studies and demonstrated the cost-effectiveness of the blocks. This technology increases animal performance. The project helped to disseminate this information to a large number of farmers through demonstrations, training, farmers' days, and the mass media. As a result, at least four Member States have established micro-financing schemes for farmer groups in the revolving fund for the manufacture of UMMBs.

### Combating Erosion Through Reforestation

To achieve sustainable agricultural production, it is imperative to explore alternative integrated soil and nutrient management systems with minimum environmental degradation. Agroforestry practices, which involve combining trees with crops or animals, can play a major role in this regard. *RAS/5/029—Nuclear Techniques for the Promotion of Agroforestry Systems* was initiated with the overall aim to develop and promote agroforestry systems so that soil fertility and crop yields could be increased. As a result of the project, the use of hedgerows in the **Indonesia, Philippines, and Sri Lanka** led to an increase in agricultural products, such as coffee bean yields from 1.0 to 5.6 tonnes per hectare. **Viet Nam** demonstrated the ability to arrest soil erosion and increase the yield of upland rice farming by 50% through green manuring of tree pruning. In **China**, a mixed system of timber and nitrogen fixing trees suited to infertile soils in dry areas is now being adopted by farmers, increasing the total content of nitrogen in the soil by 20%.

## Environment

81. One of the challenges facing the environment in this region is the threat of toxins from algal bloom, known as red tide, which affects shellfish and ultimately humans. The facilities and expertise necessary to analyze red tide toxin through radiometric receptor-binding assay (RBA) technique using tritium-labelled saxitoxin have been made available with the support of *PHI/7/006—Nuclear Techniques to Study the Red Tide Problem*. A manual of procedures for RBA was prepared following a regional workshop in Manila. Assay inter-comparison studies with NOS/NOAA, South Carolina, USA, have been performed with accurate and repeatable results.

82. The 5-year joint UNDP/RCA/IAEA project *RAS/8/076—Better Management of the Environment, Natural Resources, and Industrial Growth Through Isotope and Radiation Technology* has as its overall objective to improve management of natural resources and to increase sustainable industrial development through application of isotope and radiation sciences. A strong focus on applications and end-user requirements made the development of partnerships and collaborative projects with regional, governmental, and private sector agencies essential.

83. As a result of this project, the counterparts achieved the following results. The use of predictive models for sedimentation and contamination of three major harbors led to the sustainable use and development of these harbours. Also, sources and movement of chemical pollutants in the harbors have been determined. A network of nuclear institutes and

environmental management agencies in the region worked together to validate sampling and analytical methods for air particulate matter that were harmonized throughout the region. Data on ambient air quality in key metropolitan centres throughout the region are now available. These data will act as a baseline for monitoring trends in air pollution and as a springboard for studies of transboundary air pollution problems. With the use of an electronic network, developing countries receive information on the safe use of isotope technologies via distance learning materials in radiation protection and also receive guidelines for emergency response issues. Field studies in water resource issues identified arsenic pollution as a more widespread problem in the region than originally thought.

## Human Health

84. Responding to the training needs of Medical Physicists, RCA organized two training courses during 2000 under *RAS/6/027—Quality Assurance in Radiation Therapy*. Both courses introduced concepts and programming trends that participants could apply immediately in their home institutes. In addition, the course facilitated the development of a local network between the Medical Physicists to share experience and information on radiotherapy protocols and quality assurance programmes.

85. The Nuclear Power Institute of China (NPIC), **China**, and Board of Radiation and Isotope Technology (BRIT), **India**, are now capable of supplying quality-assured cobalt-60 sealed sources for brachytherapy machines as a result of *RAS/4/018—Manufacture and Quality Assurance of Co-60 Brachytherapy Sources*. This project was started because the supplier of these sources ceased production. Owners of the approximately 200 cobalt-60 high dose rate brachytherapy units in the region will be assured of a continuous supply of sealed sources.

### Routine Diagnosis of Dengue Fever Is Just a Step Away

The focus of project *SRL/6/024—Rapid Diagnosis of Dengue Fever Infection* is to validate and adapt a rapid nuclear-based diagnostic procedure using reverse transcription and polymerase chain reaction (RT-PCR) technique and transfer it to the Medical Research Institute (a national medical laboratory in **Sri Lanka**) and the University of Kelanya for routine diagnosis. As a result of this project, the RT-PCR based technique for detection of dengue virus has been successfully developed in the University of Colombo and transferred to the Medical Research Institute. Staff of the University of Colombo also prepared a technical manual which will be used to facilitate the future transfer of the technology. It is expected that the routine diagnosis using RT-PCR solution hybridization technique will be established in the Medical Research Institute and the University of Kelanya in 2001.

## Industrial Applications

86. The technical co-operation programme strives to transfer to end-users the expertise necessary to sustain technology to solve real problems. Radiotracer and sealed source techniques have been applied to several industrial end-users in **Thailand**, in particular, the petrochemical industry through *THA/8/013—Radiotracers and Sealed Sources in the Petrochemical Industry*. The counterpart has used the radioactive tracer techniques for on-site liquid flow rate measurement and diagnosis of leakage in a two-phase heat exchanger; the neutron back scattering technique has been used for inspecting the level, interface, moisture, and corrosion in pipes, storage oil tanks, and other vessels; and the portable X-

clad instrument has been used as a tool for monitoring internal and external corrosion in pipes covered with plastic or other materials.

87. Through *CPR/8/010—Using Radiotracers to Determine Residual Oil Saturation*, the China Institute of Atomic Energy (CIAE) has conducted interwell tracer test (IWTT) experiments and has gained some capability to interpret IWTT data. An organizational model with a central tracer group at the institute and associated tracer groups at the various oil fields is innovative, and this should be encouraged to ensure exchange of nuclear analytical techniques, evaluation and simulation methods, and reservoir information. This project also paved the way for technical and scientific contacts with tracer experts between **China** and **Viet Nam**. In addition, China has developed a field station into a jointly held company.

88. The project *VIE/8/010—Radiation Sterilization of Health Care Products* established an irradiation centre at Ho Chi Minh City for the sterilization of medical products and pharmaceuticals to provide a commercially viable industry in **Viet Nam**. Since the inauguration of the irradiation facility, the counterpart has operated the irradiator at 85% of its maximum capacity of 8,000 hours per year. The facility has sterilized more than 400 cubic metres of healthcare products and packaging materials, and 3,600 tons of food, spices, and herbal medicine has passed through the irradiation centre for pasteurization. The irradiator is also used for applied research and development. Because of the high demand for irradiation services, project managers have plans to upgrade the source strength and improve the material transport system.

## Radiation Protection

89. At the regional level, efforts were made to promote the dissemination of the optimization principle in accordance with the BSS. Through Model Project *RAS/9/022—Improving Occupational Radiation Protection in NPPs* participating countries in collaboration with the International Society of Occupational Exposure (ISOE) organized a meeting which emphasized as low as reasonably achievable (ALARA) methods. Through this project, the counterpart and authorities increased the ALARA awareness, made available task-specific dose information, initiated actions to implement ALARA practices in nuclear power plants, and reduced the collective dose and individual doses to workers. The counterpart compiled ALARA “train the trainers” material for future sessions.

90. In an effort to strengthen national and regional networking, a meeting on Strengthening of National Capabilities for Response to Radiological Emergencies was held. Legal and technical personnel from all Member States of the region attended this meeting. The meeting took into account emergency activities in the region, and participants agreed on measures to strengthen the national radiological emergency response systems aiming towards increased co-ordination with or integration into National Civil Defence and National Natural Disaster Committees. The result of the meeting formed the basis for implementation of milestone 5 of Model Project *RAS/9/027*.

91. Under *PHI/9/022—Radiation Protection Regulations and Emergency Response*, the Philippine Nuclear Research Institute (PNRI) Task Force for the formulation of national radiation protection standards based on Safety Series 115 completed a final report which contains the National Radiological Emergency Planning and Preparedness Plan. Two table-top exercises were conducted to determine the adequacy of the response of the members of the national radiological emergency organization. The counterpart submitted the Plan, and the **Philippine** National Disaster Co-ordination Council approved it.

## **Nuclear Power and Safety**

92. In **Pakistan**, through the project *PAK/9/022—Improving Safety Features of KANUPP*, a workshop on the Easy Fix Programme for seismic upgrading of Karachi Nuclear Power Plant (KANUPP) was carried out. In co-ordination with the counterpart, the Agency reviewed the progress in the areas of seismic capacity and seismic input evaluation and prepared a detailed workplan for the Easy Fix Programme for seismic upgrading of KANUPP.

## **3. Europe**

93. In preparation for the 2001-2002 cycle, an effort was made to reduce the number of national projects, concentrating the limited financial and human resources in a few high-priority areas. As a result of upstream work, which included visits by the Agency staff and external experts to every country, the number of national requests submitted for the new cycle was reduced to 150 from over 200 for the 1999-2000 biennium, reflecting more effective upstream work and increased counterpart awareness of the TC Strategy. Eight new Country Programme Frameworks (CPFs) were jointly completed and endorsed by the Agency and the Governments in 2000.

94. An innovative project in the field of nuclear applications was developed during the upstream work of 2000. *RER/1/005—Field Testing and Demonstration of a Pulsed Neutron Generator for Humanitarian Demining* has attracted much attention and support both inside and outside the region.

95. The General Conference (GC(44)/RES/2) approved the application for membership of Azerbaijan in 2000, subject to completion by Azerbaijan of the ratification process required by the Agency's Statute, bringing the future total number of TC recipient states in Europe to 27. A fact-finding mission to that country resulted in the formulation of a future national technical co-operation project.

96. Europe projects attracted extrabudgetary support in 2000. For example, Sweden announced a substantial contribution to regional project *RER/9/060—Physical Protection and Security of Nuclear Materials*. Another feature was the growing number of projects with direct government cost-sharing. Bosnia and Herzegovina and Romania have followed the example of the Czech Republic, Latvia, and the former Yugoslav Republic of Macedonia by making direct contributions to their national projects in 2000.

## **Nuclear Power and Safety**

97. Nuclear power and safety continued to remain the highest priorities of the region, accounting for nearly 60% of the budget.

98. Three major regional projects, *RER/9/046—Support for Safety Assessment*, *RER/9/047—Capacity for Assessment of Operational Safety of NPPs*, and *RER/9/052—Nuclear Safety Regulatory Infrastructure*, worked to achieve improvements in nuclear safety, but these improvements are difficult to measure in any conventional sense. International and independent peer reviews and expert views on attainment of safety standards provide the best sources for measuring project results. In addition to the Agency's own international review missions, the Western European Nuclear Regulators' Association (WENRA), for example, concluded that the nuclear regulatory authorities of the EU candidate countries made much progress and, in many cases, the authorities now have practices comparable with western European countries.

99. Complementary to the above-mentioned projects, *RER/4/011—Improving NPP Operation Management* and *RER/4/020—Advanced NDT of Primary Circuit Components of WWER Reactors* addressed such current issues as the impact of privatization and market deregulation, nuclear power plant (NPP) life management, strengthening quality management systems, and on the technical side, testing of reactor primary circuit integrity. An average of 60 events involving 600 people per year (workshops, training courses, expert missions) took place through these projects.

100. The project in **Hungary**, *HUN/9/020—Emergency Response Preparedness*, established an independent multi-purpose centre that will provide emergency response services, train regulators, and conduct accident analyses. All nuclear facilities in Hungary now have on-site emergency plans.

101. The **Czech Republic** requested Agency assistance to compare its safety assessment practices of safety-related civil structures, including containment structures, with those practices used in other countries. Project *CZR/9/011—Regulatory Assessment of Civil Structures in NPPs* contributed significantly to the definition of a set of criteria on the durability of concrete containment structures for nuclear safety assessment purposes. The project assisted in strengthening the capabilities of the counterpart to provide technical support to the State Office for Nuclear Safety for the assessment of nuclear-related civil construction in Czech NPPs. As a result, the counterpart helped to complete the assessment of the Temelin NPP safety analysis report (SAR). The project also offered opportunities to develop co-operation with the Laboratoire des Ponts et Chaussées in France.

102. The Agency provided expert services for the extension of a probabilistic safety assessment (PSA) model developed for the Cernavoda NPP in **Romania**. Under project *ROM/9/023—Nuclear Safety Assessment of Cernavoda NPP*, four expert missions advised on various aspects of nuclear safety, including the assessment of computer codes for CANDU-6 accident analysis. The project contributed to a considerable transfer of expertise on NPP safety. In addition, the comprehensive set of safety assessment studies developed for Cernavoda NPP can now be used for decision-making on safety-related issues.

103. The Turkish Atomic Energy Authority (TAEA) requested the Agency to assist with the safety reassessment of the TR-2 research reactor at Çekmece, **Turkey**. *TUR/9/014—Reassessment of Seismic Qualifications of TR-2 Research Reactor Building* contributed to developing TAEA's capabilities to independently assess the seismic qualifications of existing facilities, design upgrading measures, and evaluate the environmental impact of potential accidents. Çekmece TR-2 reactor may serve as a valuable and safe training centre for operators in the country, if a national nuclear programme develops.

104. Under project *RUS/9/002—Safety Review of Nuclear Power Plants*, the **Russian Federation** shifted the focus from updating accident analysis technologies to operational safety of NPPs in order to address such issues as operational review techniques, engineering assessments, and safety culture. The counterparts and the Agency jointly developed a new workplan for operational safety in 2000, and it is being implemented successfully and on schedule.

### Research Reactor Safety

The construction of nuclear research reactors in Europe reached a peak between 30 and 40 years ago. They are now generally obsolete and in need of financial support to maintain or recover safety levels. In many cases, their stocks of spent fuel are insecurely stored and building up with few or no opportunities for disposal. Regional project *RER/9/058—Safety Review of Research Reactor Facilities* is addressing the safety concerns associated with the existing research reactors in a systematic manner. Fact-finding missions to **Belarus, Bulgaria, Poland, Russia, and Ukraine** reviewed and investigated safety, spent fuel storage, management, and utilization. The missions also gathered the associated regulatory authorities' viewpoints. Project counterparts made an effort to collate the experience from different facilities and to advise on possible future actions, ranging from major initiatives, such as a possible fuel take-back to the country of origin to provision of minor safety-related equipment. Three workshops were organized in 2000 covering the subjects of characterization, management, and storage of spent fuel; safety culture; and safety assessment and conduct of inspections (a workshop for regulators). A group of independent experts which evaluated the IAEA programme on research reactors in 2000 commended the approach of the project and recommended it as a model for further Agency activities in this field.

### Radiation Protection and Waste Safety

105. Assistance with regard to radiation safety and related infrastructure upgrading continued to be offered to 11 Member States in the region through Model Project *RER/9/056—Upgrading Radiation Protection Infrastructure*. Governments now have efficient mechanisms to ensure the safety of radiation sources and to control exposure of radiation workers according to international standards. During 2000, the Agency assisted the counterparts in obtaining these mechanisms by holding four regional training courses attended by about 100 participants and 12 national training courses attended by about 300 participants.

### Chernobyl - 15 Years of Agency Involvement

The year 2001 marks the 15<sup>th</sup> anniversary of the Chernobyl accident. Contributing to the mitigation of the Chernobyl consequences has been one of the priority areas for the Agency's technical-co-operation assistance throughout these years.

Technical co-operation activities started in 1990 with Programme Reserve projects in **Belarus, Russia, and Ukraine** providing assistance in radiation monitoring of contaminated areas. Subsequently, a number of projects in Belarus and Ukraine addressing the humanitarian dimension of the accident have been implemented. Such projects helped to bring back to use contaminated territories and thus improve the socio-economic situation in this region (*BYE/5/004—Edible Oil from Rapeseed Grown on Contaminated Land; BYE/9/006—Rehabilitation of Chernobyl Affected Territories; and UKR/9/007—Reduction of Radionuclides in Human Food and Environment*). The Governor of Belarus, during the IAEA Board of Governors meeting, characterized the TC assistance to his country, whose territory was seriously contaminated as a result of the accident, as the most effective among all efforts of the UN organizations.

The Chernobyl follow-up effort included extensive training activities in prevention of such disasters and preparedness for any accidents involving radiological releases. The regional programme in Europe included several large projects focusing on the follow-up efforts, e.g., *RER/9/049—Medical Education for Nuclear Accident Preparedness* and *RER/9/050—Harmonization of Regional Nuclear Accident Preparedness*.

With the closure of the last unit of Chernobyl NPP in Ukraine, new TC projects were initiated in the field of decommissioning, including assistance to the Chernobyl Shelter over the damaged Unit 4.

In 1999-2000, the technical co-operation programme disbursed close to \$7 million in national and regional projects addressing the consequences of the Chernobyl accident. Based on the requests of the affected Member States, the Agency will continue to provide assistance in this field.

106. Considerable experience on decontamination of individual dwellings and public buildings was accumulated within the framework of the regional project *RER/9/059—Reducing External Exposure Doses in Contaminated Villages*. Experts from Belarus, Denmark, Hungary, Russia, Ukraine, and the Agency published their results in the "Guide on Decontamination of Settlements in the Remote Period After Radioactive Contamination with Long-Lived Radionuclides" which provides useful information for decision-makers. By employing the methods and techniques promoted through the project, significant reduction of the external dose to inhabitants of the areas contaminated with radionuclides still can be achieved at reasonable expenses.

107. A workshop on the Novi Han Repository in **Bulgaria** exemplifies the dissemination of experience to other interested Member States in the region (*BUL/4/005—Increasing Safety of Novi Han Radioactive Waste Repository*). The repository is a RADON design, typical of facilities from the former Soviet Union. The exchange of information on operational experience and upgrading between countries with similar repositories will improve the safety issues associated with these facilities.

108. A potentially hazardous radiological situation developed in **Georgia** with orphan radiation sources in the late 1990s. Discovery of high-activity orphan sources (strontium-90 from thermo-generators) required a more detailed and broader scale search. Following an additional request from the Georgian Government for assistance in localization and safe

disposal of orphan sources, the Agency approved a new Programme Reserve project, *GEO/9/006—Assistance for Safe Disposal of Sr-90 Thermo-generators*. In the scope of this project, 56 hours of airborne gamma survey of a large territory in Western Georgia and around Tbilisi were carried out with co-operation between French, Georgian, and Agency experts. This resulted in finding a cesium-137 orphan source in a residential area in Poty. In addition, the survey identified areas contaminated from the Chernobyl fallout and provided data for a background radiation map of the western part of Georgia.

### **Decommissioning of Nuclear Facilities**

109. In addition to the traditional technical co-operation issues, the Agency is involved in a high-interest, newly emerging topic in the region—decommissioning of NPPs and research reactors. A programming effort for Armenia, Bulgaria, Lithuania, and Ukraine began last year.

110. One major step taken in this direction was the quick response of the Agency to an urgent request from **Lithuania** for a review of the decommissioning programme for Ignalina NPP. In this connection, a project in 2000 (*LIT/4/002*) funded by the Programme Reserve provided technical advice and training, specifically to review the technical terms of reference for planned decontamination and decommissioning activities.

111. *UKR/4/007—Planning for Decommissioning Nuclear Power Plants* has already enabled the country to develop conceptual strategies and to identify the necessary resources and infrastructure for decommissioning Ukrainian WWER-type NPPs. Furthermore, following the closure of Chernobyl's last operating unit, the IAEA TC Programme for Ukraine considers the decommissioning of the Chernobyl RBMK-type plant as its first priority for the future. During 2000, the Agency assisted in completing the groundwork for an integrated approach to planning, management, and implementation of unit decommissioning.

### **Human Health**

112. The Agency continued to provide high-quality training to radiotherapy clinicians and medical physicists in Europe. Through IAEA/ESTRO co-ordination, more than 400 specialists from the region received training in radiation therapy.

113. Within the framework of two regional projects, *RER/6/008—Building Capacity in Medical Physics* and *RER/6/009—Upgrading of Radiotherapy for the Treatment of Cancer*, the number of IAEA/ESTRO co-ordinated training courses increased and the number of those trained rose to 130 in 2000. Because of the increase in attendance at a course given with simultaneous translation into Russian in 1999, this course will become an annual event starting in 2001. Selected radiotherapy departments in the region were supplied with \$1.5 million worth of new equipment or upgrades of existing machines required for the safe and efficient delivery of radiation treatment to cancer patients. As this included items for both clinical and medical physics quality assurance (QA), besides therapy equipment, the project helped to create the basis for the consolidation and/or establishment of Centres of Competence in the Member States of the region. This has the goal of covering all relevant areas of radiotherapy. These Centres of Competence will serve as national models in assisting and improving radiotherapy in other centres of the country.

114. Thyroid dysfunction diseases are prevalent in a number of countries. As human thyrotropin (h-TSH) is now the most widely accepted analysis in screening neonatal hypothyroidism, the goal of a project in **Romania**, *ROM/6/014—Kits for Diagnosis of Thyroid Dysfunction*, was to develop a sensitive h-TSH-immunoradiometric assay (IRMA) kit. The Agency provided equipment for the radioimmunoassay (RIA) laboratory, expert services, and training of local staff in quality control (QC) of RIA. As a result, the Institute of Research and Development for Physics and Nuclear Engineering produced an h-TSH-IRMA kit at a cost

much lower than that of imported kits, making it possible to screen a larger number of patients.

## Environment

115. The Agency and its counterpart in **Portugal** successfully put into full operation a production facility under *POR/5/005—Mediterranean Fruit Fly Programme in Madeira*. The counterpart received assistance with the design, operation, and maintenance of a sterile mass-rearing fruit fly facility. The Agency provided a cobalt-60 radiation source, entomological equipment, and other supplementary equipment.

116. The Baltic Sea was contaminated following the Chernobyl accident to a higher degree than other regional seas. The Agency Model Project *LIT/2/002—Assessment of Radionuclide Migration in the Baltic Sea* assisted **Lithuania** to evaluate the mechanisms and effects of radionuclide transfer in the marine environment. As a result of this project, the counterpart simulated the dispersal of pollutants in the shallow waters off the Lithuanian coast of the Baltic Sea and Curonian Lagoon.

## 4. Latin America

117. National Liaison Officers (NLOs) in Latin America took another step forward to enhance Technical Co-operation among Developing Countries (TCDC). Making use of the existing strengths within the countries, the Officers selected five projects, out of 40 analyzed, to be implemented through mutual co-operation in the 2001-2002 cycle involving Bolivia, Brazil, Chile, Guatemala, Mexico, and Peru. This TCDC initiative was discussed during a meeting held in Lima, Peru, in November 2000.

118. The NLOs also met to form a co-ordinated approach for the regional technical co-operation programme. Together, they reviewed the current issues affecting technical co-operation programming and implementation. Proper information about the national development policy, effective investment plans, and international funds (essentially the Agency's central criterion) were stated as a fundamental condition for structuring future technical co-operation programmes in the region.

## Radiation Protection and Waste Safety

119. During 2000, Model Project *RLA/9/030—Upgrading Radiation Protection Infrastructure* delivered more than 60 weeks of expert assistance, four regional training courses, and national training courses. Personalized training programmes were carried out through fellowships in order to upgrade those areas of radiation protection which still need to be reinforced in the countries. **Guatemala** and **Paraguay** approved their national radiation protection regulations during 2000. Therefore, eight countries out of ten have radiation protection regulations in place; the other two are in the final stage of approval. In addition, nine out of ten countries have personal monitoring systems in operation.

120. **Cuba** has around 2,000 x-ray machines for radiodiagnostics. Therefore, the country has requested Agency assistance to establish a national system of radiological protection and quality control (QC) in radiodiagnostics by applying the international Basic Safety Standards (BSS). Through *CUB/9/013—Radiation Protection in Diagnostic Radiology*, experts provided advice on x-ray QC, dosimetry and image quality, as well as on how to design and implement a national programme on quality assurance (QA) in diagnostic radiology. In addition, the experts helped to implement the BSS, Appendix II, by means of a step-by-step approach with emphasis on QA, image quality, and patient dosimetry. As a result of the project, the national health authorities are capable of undertaking a dose

reduction programme and improving radiation safety conditions for patients and healthcare workers.

121. Radioactive waste in **Mexico** comes from nuclear, industrial, and medical applications. Liquid and solid radioactive waste is temporarily stored at CADER of the National Nuclear Research Institute (ININ). Aiming at establishing an integrated national policy for radioactive waste management, Mexican authorities requested the Agency's assistance to obtain the basic knowledge and infrastructure for implementing a waste safety policy, putting special emphasis on upgrading the safety of CADER. As a result of *MEX/9/046—Upgrading Safety of Radioactive Waste Management*, the safety of CADER has been enhanced, and the national capability has been established to support the authorities in the implementation of a comprehensive and integrated waste management system.

## Human Health

122. A majority of Latin American countries lack a sufficient number of specialists in Medical Physics and there is a need to increase the number of medical physicists working in hospitals. **Venezuela** recognized this situation and the Government authorities asked for assistance to establish graduate courses in Medical Physics at the Venezuelan Institute of Scientific Research (IVIC) under *VEN/6/007—Medical Physics*. The project was eventually made into a regional project with the approval of ARCAL, *RLA/6/041—Strengthening the Master of Medical Physics Degree (ARCAL L)*. **Bolivia, Brazil, Chile, Columbia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Paraguay, and Peru** were the Member States involved in this project, along with Venezuela.

123. The first course started with 19 students in March 2000 in Caracas, Venezuela. It is expected that the students will graduate in 2002, after the conclusion of practical work in hospitals. In November 2000, a panel of experts selected 12 new candidates for the second course to be held in Venezuela from March 2001 to February 2002.

### Radio-guided Surgery Reduces Operating Time

The Agency assisted San Juan de Dios Hospital, **Costa Rica**, to expand and improve oncological nuclear medicine services to include areas such as monoclonal antibodies, meta-iodobenzylguanidine, somatostatin analogues, and pre- and post-operative sentinel node detection. Through project *COS/6/013—Nuclear Oncology*, a non-commercial human albumin colloid, with the ideal particle size for detection of the sentinel node, was developed along with the required QC procedure. Radio-guided techniques, transferred through the project, have allowed the reduction of surgery times from about four hours to less than 60 minutes. So far 51 radio-guided operations have been performed.

124. Cancer is the second most frequent cause of death in **Cuba**, with an annual rate of 124 cases per 100,000 inhabitants. Because Cuba is in the process of replacing seven of its cobalt-60 teletherapy units, authorities requested Agency assistance to raise the level of radiotherapy physics to improve the accuracy of doses delivered in cancer treatment. Through project *CUB/6/011—National Programme for Physical Aspects of Quality Assurance*, the Agency strengthened the Cuban capabilities in radiotherapy treatment by means of implementing a QA programme, as well as extensive individual training on QA for brachytherapy, treatment planning, and radiotherapy.

125. The National Radiotherapy Centre (CNR) is the only public institution in **Nicaragua** providing cancer treatment with radiotherapy to the low-income sector. The teletherapy system had a source with low activity, which reduced the quality of treatment and the number of patients treated per day. Therefore, the Nicaraguan Health Authorities requested Agency assistance to refurbish the only cobalt-60 teletherapy machine existing in the country. Under *NIC/6/005—Refurbishing of Cobalt Source for Teletherapy Unit*, the Agency provided a new cobalt-60 source, maintenance for the machine, and calibration of the unit. As a result, the CNR significantly improved radiotherapy services, treating up to 100 patients per day.

126. Programmes for early detection of neonatal hypothyroidism and for local production of related reagents for RIA of hormones were established under previous Agency projects in **Guatemala**. Under *GUA/6/012—Neonatal Hypothyroidism Screening in Rural Areas*, the Agency assisted in extending these activities to rural areas and marginal communities. As a result of the project, personnel received training to perform blood specimen testing on newborns at the hospital in Mazatanango and in Coban in an effort to implement a screening programme in western, northern, and eastern Guatemala. As of now, more than 40,000 babies have been screened, and several dozen positive cases of hypothyroidism were detected. Currently being implemented, an expanded RIA service will cover a wider segment of the population through a national network, and it is expected to significantly decrease the incidence of cretinism, thyroid disease, and hepatitis B with considerable socio-economic benefits, particularly to marginal communities.

127. Because the needs of hospitals in **Mexico** for biological tissue grafts to treat various clinical cases are increasing, the authorities requested help to establish the technique of irradiating biological tissues for clinical use as well as relevant QC and QA procedures. As a result of *MEX/7/008—Sterilization of Biological Tissue Using Ionizing Radiation*, human and technical capabilities for the production of radiation-sterilized tissue grafts are now available, the tissue bank at the ININ is open, and a related campaign for public support increased the number of tissue donors.

## Environment and Water Resource Management

128. **Costa Rica** requested Agency assistance to address pollution problems that effect wells providing drinking water to the Central Valley, where more than 50% of the total population of the country is concentrated. Through project *COS/8/007—Sustainable Management of Groundwater in the Central Valley*, experts provided assistance to study the origin and dynamics of groundwater, mineral and organic pollutant behavior and transport mechanisms in the environment, and ways to improve the use of nitrogen fertilizers, thus limiting the impact of these chemicals on the groundwater quality. The detailed information obtained on the groundwater and pollutant dynamics in the aquifer systems is of value for defining exploitation strategies and recommending changes in the use of soil and water in different areas. This information provided the baseline for establishing a policy on water resources preservation in the Central Valley.

129. Lake Xolotlan (Lake Managua) is heavily polluted, and **Nicaragua** requested assistance to deal with the pollution problems. Through *NIC/8/010—Evaluation of Anthropogenic Impact on Lake Xolotlan*, the Agency assisted the Nicaraguan authorities in determining heavy metal contamination and assessing groundwater inflow and outflow rates to the lake. The information generated by the project indicated exceptionally high contents of lead, mercury, copper, chromium, and zinc. This data can be related to industrial and agricultural activities and is an essential input to a programme for better management of the lake.

130. Lake Titicaca is important for a vast region of **Bolivia** and **Peru**. It is the main water source for more than one million inhabitants as well as a food source (fishing). Results from *RLA/8/022—Binational Project Bolivia-Peru: Lake Titicaca Water Balance* helped to determine how the lake can be regulated. During the project, the Autoridad Autónoma del

Lago Titicaca acquired basic know-how for monitoring the environmental conditions in the lake and some equipment.

131. **Ecuador** is the world's largest exporter of bananas and second largest shrimp exporter. *ECU/5/021—Monitoring the Fate of Pesticide Residues* aims to improve national capabilities for pesticide risk assessment through the application of nuclear and related techniques, especially analytical QA and implementation of best management practices in the Guayas River Catchment for sustainable agricultural production. Results achieved during 2000 include: improved analytical capacity and more cost-effective residue analyses; preliminary pesticide hazard index ranking to focus resources on the key problem(s); and baseline data collected to validate decision support tools. The project involved all relevant stakeholders, especially related to water management, by using the Internet and FarmNet to communicate results and facilitate feedback.

### **Food and Agriculture**

132. The National Diagnostic and Service Laboratory for Animal Diseases (LIDIVET) in **Bolivia** has improved its diagnostic capability through *BOL/5/009—Animal Health in Eastern Bolivia* by assessing the epidemiology of brucellosis and foot and mouth disease (FMD) and initiating control methods for both diseases. The enzyme-linked immunosorbent assay (ELISA) technique is now routinely applied to the diagnosis of these and other diseases of importance to the livestock industry in Bolivia. By strengthening the national disease control programme in Bolivia, the laboratory can now provide a more rapid and reliable diagnostic service to private farmer associations. As a result, these groups assist in financing and executing the control and eradication of FMD and brucellosis.

133. Increasing milk production is one of the priorities of the Ministry of Agriculture and Livestock of **Paraguay**. Through *PAR/5/008—Improving Reproductive Efficiency in Cattle*, Ministry laboratories and small to medium sized farms are using RIA techniques for detecting ovarian activity, diagnosing fertilization failure, and detecting heat (oestrus) to increase conception rates and shorten calving intervals to 13-14 months. Because of these techniques, production costs for the farmers have decreased.

134. Production of milk from sheep is a commercially viable alternative to dairy cattle production, especially for small-scale farmers. However, a limitation is the lack of improved dairy breeds of sheep for use by the local farmers. **Uruguay** improved milk production and reproductive performance of sheep by crossing milking breeds with local breeds through project *URU/5/021—RIA as a Tool to Improve Milk Production in Sheep*. The Agency assisted in formulating and implementing a strategy for providing the farmers with improved sheep breeds. Two large breeding farms serve as nucleus flocks for multiplication of the elite sheep produced by embryo transfer. This project has clearly identified the way forward for a sustainable milk production system for small-scale farmers.

### **Nuclear Power and Safety**

135. The Agency's work in **Brazil** related to nuclear power plants (NPPs) is extensive. Under *BRA/8/027—Non-destructive Testing for Inspection of NPP Materials*, the country achieved sustained capability to apply ultrasonic testing techniques for monitoring and investigation of stress cracking in pressurized systems of NPPs with a positive impact on the level of nuclear safety. NPP aging analysis was the focus of *BRA/4/045—Life Management of Nuclear Reactor Safety Components*. The Nuclear Technology Center (CDTN/CNEN Belo Horizonte) developed a system to evaluate and monitor the behavior of nuclear reactor pressure vessels and piping, degradation mechanisms, and implementation of mitigation programmes in line with the overall Brazilian Nuclear Safety Programme. In this project, CDTN worked with ELECTRONUCLEAR, owner of ANGRA I and ANGRA II NPP. Additionally, CDTN is also working in facility-life management at the thermal-electric facility of

Centrais Energeticas de Minas Gerais (CEMIG) to acquire the capability to develop their own technology of life management to be used at more complex NPPs. As a result, CDTN is performing, on a routine basis, life assurance evaluation of reactor components which provide the information that support the authorities in licensing units I and II of ANGRA Power Station.

136. Also, with the contribution of *BRA/4/047—Fuel Improvement for the IPEN Research Reactor* implemented at the Institute of Nuclear Energy and Research (IPEN) in Sao Paulo, the power capacity of IEA-R1 research reactor has been increased from 2 MW to 5 MW to improve the radioisotope production to meet the demand for radiopharmaceutical medicines.

### **Industrial Applications**

137. The ARCAL project *RLA/8/024—Industrial Application of Tracer Technology and NCD (ARCAL XLIII)* and national TC projects *CHI/8/024—Nuclear Techniques in Copper Mining*, *COL/8/020—Nuclear Techniques in Coal Mining*, and *PER/8/011—Nuclear Techniques in Mining and Industry* have created and consolidated the capability to apply radioisotope techniques in routine service to industrial end-users in the Latin American region. With Agency assistance, counterparts produced technical documents and disseminated them to facilitate the transfer of technology. As a result of the project, the following major techniques were established and consolidated: 1) tracer residence time distribution (RTD) for troubleshooting diagnosis and process optimization; 2) tracer techniques for flow-rate measurement, calibration, and leak detection; and 3) gamma and neutron scanning technique for inspection of columns and tanks in oil refineries. The benefit from the application of column scanning in a medium-sized petroleum refinery is up to \$100,000 per year, while the one-time investment for the equipment is \$10,000.

138. In addition to the above-mentioned techniques, the Agency transferred two more techniques: tracers in oil fields for enhancement of oil recovery in **Argentina, Brazil, Colombia, Ecuador, Mexico, Peru, and Venezuela** and prompt gamma neutron activation analysis (PGNAA) technique for copper and coal on-line and bore hole analysis in **Chile and Colombia**. Oil production through the investigation of the secondary recovery processes using radiotracers is estimated to be enhanced by 10%-15% of the residual oil for each oil field, which implies an economic benefit of several million US dollars per year. Secondly, the CrossBelt Analyzer uses the PGNAA technique to bring additional control to the copper manufacturing process. With accurate minute-by-minute analysis of their entire material flow, manufacturers can increase copper recovery, while reducing fuel, grinding, and refractory costs. The counterpart can recover the cost of the PGNAA system in 3-4 months of plant operation. The authorities put a PGNAA system into operation with good preliminary results.

### **Library Without Walls**

Establishing an electronic network among the 15 participating countries for the exchange of ideas, experience, questions, and full text nuclear documents was one of the objectives of *RLA/0/017—Regional Information Network in the Nuclear Field (ARCAL XLII)*. Over the past two years, the exchange of documents has increased by more than 300%. This network allows any participating country to have access to books, documents, and materials located in any information centre of these countries. In previous years, the contribution from the region to the International Nuclear Information System (INIS) database was an average of 1,173 items of literature per year. During 2000, this rose to 3,603. The counterpart made additional arrangements with the British Library Document Supply Centre in the UK to have access to documents not available in the region.

## **5. West Asia**

139. Effective upstream work and increased counterpart awareness of the TC Strategy led to better quality national project requests for the 2001-2002 cycle. This was reflected in a lower rate of rejection during the appraisal process compared with those from earlier cycles. The West Asia region took a fresh initiative in identifying the needs of the Member States by arranging a formal briefing session in Vienna, followed by a questionnaire to the national counterparts asking them to indicate the priority level for regional activities in each of the different technical fields.

140. Cost-sharing schemes with Member States increased considerably. This increase indicates the priority attached to the timely implementation of the projects by the countries concerned. The contribution of extrabudgetary funds in 2000 also showed an increase compared with the amount received in the previous years. The programming exercise completed during the year indicated that cost-sharing and extrabudgetary contributions were likely to increase further in the next cycle.

141. The General Conference (GC (44)/RES/1) approved the application for membership of Tajikistan in 2000, subject to completion by Tajikistan of the ratification process required by the Agency's Statute.

## Human Health

### Newborn Screening Project Concluded, but the Work Continues

Under *RAW/6/003—Screening of Newborns for Thyroid Deficiency*, participating Member States established and validated the methodologies of bulk reagent-based radioimmunoassay/ immunoradiometric assay (RIA/IRMA) for the thyroid-related hormones T4 and TSH. The early clinical studies were followed by the extension of the methodology to as many peripheral laboratories as possible in order to establish the screening programme at a number of hospitals and laboratories, and concurrently allow national health authorities adequate lead time to improve the logistics of national screening programmes and make them sustainable. Over the project's life, the laboratories screened close to 100,000 babies in the region, resulting in the detection of 40 cases of hypothyroidism which were treated and suitably followed up. The Agency assisted in establishing local reagent production, which resulted in a reduction in cost with less dependence on imported materials. The project enabled the participating countries to incorporate a regular screening of newborns for an early detection of hypothyroidism and to initiate timely medical intervention, where needed, in order to ensure greater chances of its cure.

142. The regional project *RAW/6/004—Maintenance and Quality Control of Nuclear Medicine Equipment* held three training courses during the year. A total of 54 participants attended these three events. Of the ten external lecturers recruited for these courses, seven were from developing countries, which reflects the emphasis placed on Technical Co-operation among Developing Countries (TCDC) and the level of advancement achieved in these countries in this area. A large number of gamma cameras in **Kazakhstan**, five in Almaty alone, were saved from premature decommissioning through a combination of steps involving the upgrading and interfacing of these cameras to PCs with installed portable imaging processing (PIP) software. Expert missions worked in close collaboration with the relevant technicians and physicians and trained them on the efficient use of the PIP software for the acquisition and processing of clinical data and on basic quality control (QC) procedures. An Agency expert translated and edited the PIP operator's manual into Russian, and a local service engineer received training in the repair and fine tuning of the upgraded gamma cameras and performed QC tests on them.

143. Through *RAW/6/007—Detection and Management of Cancer Using RIA*, an expert mission to **Yemen** installed and demonstrated the use of a gamma counter and provided training to local staff on the concepts of RIA/IRMA. Another mission to **Uzbekistan** helped in identifying the existing capabilities and requirements of four centres in the Tashkent area which have RIA/IRMA facilities. A regional training course held in Amman, **Jordan**, introduced the basic methodology for RIA of additional tumour markers. Thirteen participants from seven Member States in the region attended this event. Two of the three experts recruited under this project during this year were from developing countries.

144. The year 2000 saw the completion of a few technical co-operation activities in **Iraq**. The most significant was the commissioning of a personnel monitoring thermoluminescent dosimetry (TLD) system provided under *IRQ/6/011—Radiation Protection and Dosimetry in Nuclear Medicine*, and on-the-job training provided to a three-member Iraqi team at the supplier's laboratories on the maintenance and repair of this system.

145. The Radiation Safety Division at the Soreq Nuclear Research Centre, **Israel**, worked with the Agency to strengthen Soreq's national training centre and on-call services in quality

assurance (QA) for nuclear medicine imaging systems (*ISR/9/007—Radiation Protection in Medical Exposure*). This enhanced capability will ensure good image quality consistent with the correct diagnosis, and thus reduce significantly individual patient dose, personnel dose, and collective dose to the population.

### **Industrial Applications**

146. The project *IRA/8/013—Electron Beam Accelerator for Radiation Processing* completed its first phase, during which an electron beam accelerator, purchased by the **Islamic Republic of Iran**, was installed and made operational at the newly constructed Centre at Yazd. Agency support in 2000 concentrated on the provision of equipment for the QC laboratories. Expert services were also important and provided advice on suitable means for the measurement of high doses and on the modification and expansion of the product-handling system. The completion of this phase of work enabled the Centre to undertake work in the polymer and healthcare industries, such as sterilization of medical disposables, decontamination of pharmaceutical and cosmetic raw materials, production of heat-shrinkable tubes and tapes, and crosslinking of cables and wires and polyethylene pipes.

147. A commercial-scale cobalt-60 irradiation facility in **Jordan** under the project *JOR/7/002* was set up in 2000 at the new site for the Atomic Energy Centre on the outskirts of Amman. The site has functional laboratories for material testing and microbiological testing. The country spent a substantial amount of its own resources for this facility. After the successful installation and operational testing of the irradiator, many batches of medical products were irradiated for several local manufacturers. The facility provided the services free of charge during 2000, the first year of its operation, with a view to promoting the use of irradiation technology in the medical and cosmetic industry. The irradiator will start providing services on a commercial basis in 2001.

148. The Agency provided technical advice to the King Abdulaziz City for Science and Technology (KACST) to assist in the preparation for the establishment of **Saudi Arabia's** first electron beam accelerator facility for radiation technology applications in industry. Under *SAU/8/006—Radiation Technology for Treatment of Toxic Waste*, expert missions provided advice to KACST on the technical and economic feasibility of using radiation technology for the treatment of toxic waste. A joint feasibility study on the use of electron beam technology for the treatment of sewage has shown this option to be competitive with other alternative treatment methods used in Riyadh.

### **Radioisotope Production**

149. *IRA/4/030—Production of Miniature Sealed Sources for Brachytherapy* enabled the Nuclear Research Centre (NRC), Teheran, **Islamic Republic of Iran**, to extend its expertise in the production and QC of miniature sealed sources needed in medical and other applications. The existing welding system at the NRC was upgraded to handle small size sources. An Agency expert provided on-site training to the local staff on the establishment of optimum welding conditions, and a national expert visited an established source production facility abroad to study production techniques. The project counterpart had the opportunity to visit the Austrian Research Centre, Seibersdorf, for training in the production and QC of miniature sources and to assist in the selection of equipment suited to the project requirements. This visit also helped in promoting co-operation between the NRC and the Austrian Research Centre and resulted in a mutual arrangement for the encapsulation of the NRC-produced cobalt-60 sources at the hot cell facilities of the Austrian Research Centre.

150. Under project *KAZ/4/004—Isotope Production at WWR-K Reactor for Medical Applications*, the Agency provided to the National Nuclear Centre, Almaty, **Kazakhstan**, the necessary equipment and appliances for the production of iodine-131 and technetium-99m radioisotopes at its research reactor. The radiochemistry unit underwent repairs and

upgrading, including additional shielding installed in the cell for technetium-99m production. A separate glove box was prepared for the sterile filtration and dispensing of radiopharmaceuticals solutions. With Agency assistance, the counterpart applied QC techniques to the experimental batches produced during 2000 for the determination of concentration and purity of radionuclides and their major non-radioactive impurities. A locally manufactured unit for the production of technetium-99m with a central generator was mounted in a hot cell and the system's operating conditions and parameters optimized. The facility produced the radiopharmaceuticals and supplied them to the Institute of Oncology and Radiology and to the Scientific Centre of Surgery in Almaty for pre-clinical and clinical testing.

## **Nuclear Power and Safety**

151. Implementation of projects relating to the safety of the Bushehr Nuclear Power Plant (BNPP) and the strengthening role of the National Regulatory Authority in the **Islamic Republic of Iran** made progress during the year. The highlights included special training courses on quality assurance; establishment of a programme and a conceptual document on a personnel training system; the standards and procedures at the operating organization level; and training workshops for the implementation of configuration management. The Agency aided the Atomic Energy Organization of Iran (AEOI) with the on-going review of the preliminary safety analysis report (PSAR) for BNPP and also provided recommendations for its modifications and improvements. Expert missions carried out a review of the regulatory infrastructure and provided advice on regulatory inspection management and inspection procedures. The counterpart received a four-month fellowship training on the safety analysis of reactor core behavior.

152. **Kazakhstan** received assistance to characterize a site for its future nuclear power plant under project *KAZ/9/006—NPP Siting in Kazakhstan*. The Agency supplied items for six seismic stations; the counterpart installed them and made them operational. The collection of seismological monitoring data will provide important input to the site safety study for the proposed NPP near Lake Balkhash. In parallel to this activity, actions were initiated to strengthen the national regulatory authority in discharging its functions for any future national programme in nuclear power. This support consisted of technical advice through expert missions as well as the development of suitable packages for the training, qualification, and authorization of national staff in nuclear safety issues.

## **Radiation Protection**

153. Implementation of activities under the Model Project *RAW/9/006—Upgrading Radiation Protection Infrastructure* helped the participating countries make progress towards the achievement of the specific project milestones. The main highlight of the project was the first time initiation in 2000 of a one-year postgraduate diploma course in Arabic on radiation protection and safety of radiation services. The course was held at the Higher Institute of Applied Sciences at Damascus, **Syrian Arab Republic**, with the participation of 17 qualified persons from six countries in the region.

## **Waste Management**

154. The Agency provided technical advice to the **Islamic Republic of Iran** under project *IRA/4/028—Treatment of Low- and Intermediate-Level Radioactive Wastes* for an assessment of the status of an old incinerator facility at the Esfahan Centre. Experts provided recommendations for its repair, modification, and upgrading to make the facility operational and an integral part of the waste management capability in the country. During the year, fellowships and a scientific visit to an operational waste management facility abroad met a part of the training needs for local staff.

155. Under project *SYR/4/008—Radioactive Waste Management Facility*, a team of IAEA experts advised the counterpart on the establishment of a centralized waste processing and storage facility in the **Syrian Arab Republic**. Special attention was paid to waste management strategy, waste storage options and laboratory radiochemical control of raw waste, waste forms, and waste processing. The experts assessed the status and requirements for equipment in the waste processing facility and for the support laboratories. Training was provided through fellowships on the collection, segregation, transportation, and control of waste; waste processing and storage; conditioning and storage of spent sealed sources; record keeping; and overall quality assurance procedures. Training for the processing of liquid waste received special emphasis.

### **Water Resource Management**

156. Because of the heavy dependence of its economy on agriculture, **Uzbekistan** assigns a high priority to proper water management practices and fertilizer use. Under the Model Project *UZB/5/002—Optimization of Water and Fertilizer Use for Major Crops*, the Agency is providing technical advice and support to the Uzbek National Cotton Growing Institute and its regional branches on the optimum use of water and fertilizer for the two major crops, cotton and winter wheat. During the year, the Agency provided fellowship training on soil water balance and irrigation scheduling. Equipment was provided for the monitoring of moisture content in the soil, and an expert trained the project staff at the different research stations on the equipment's calibration and use for the study of water balance and plant water consumption. The activities carried out under this project helped to establish a direct bilateral contact between the counterpart institute and the USA which resulted in the provision of some technical and material support for achieving the objectives of the project.

## 6. Highlights of Completed Projects for 2000

### a) Africa

Project Number	Project Title	Project Objectives	Summary Achievements
ALG/6/008	Quality Assurance in Diagnostic Radiology and Nuclear Medicine	To establish quality assurance programmes in the area of diagnostic radiology and to increase the utilization capacity of gamma cameras by interfacing them with microcomputers.	QC procedures for mammography and CT established. Procedures and analysis for SPECT established. Portable image processing software implemented.
EGY/0/015	Assessment of Energy Sources for Electricity Generation	To undertake a comparative assessment of options and strategies for electricity generation in Egypt up to 2020.	Computer equipment and planning tools provided. Counterparts applied methodologies for a base case of the electric system expansion.
EGY/9/029	Liquid Waste Management - Phase 2	To assure the safe and efficient operation of the liquid waste management facility of the Atomic Energy Authority.	Control and instrumentation systems upgraded. Facility completed and tested in September 2000. Stored and newly generated liquid waste can now be transformed into a safe, immobilized form.
ETH/8/005	Use of Isotopes in the Study of Lake Beseka	To identify the main sources of water inflow to Lake Beseka and to establish the relationships between groundwater and surface water in the surrounding areas through the use of isotope hydrology techniques.	Reason for increase in level of lake identified using isotope techniques.
LIB/2/002	Determining Impurities in Radiopharmaceuticals	To determine chemical impurities in radiopharmaceuticals by x-ray fluorescence spectrometry.	XRF facility upgraded. Counterpart developed techniques for quality control.
MAR/6/004	Improving Quality Assurance in Radiation Therapy	To improve radiation safety and treatment quality by implementing a comprehensive quality assurance programme in the radiation therapy dosimetry.	QA training received. QA programme to be implemented.
MOR/4/012	Pre-Project Study for Nuclear Desalination	To assist the Government of Morocco to initiate the pre-project study on nuclear desalination through the provision of expert services and arranging for Moroccans to visit the supplier of small heat reactors.	Pre-project study completed with positive results. Government undertook bilateral negotiations for the supply and installation of a desalination plant.
NAM/8/002	Improved Monitoring of Water Flow Distribution	To introduce isotope hydrology to carry out indirect flow gaugings in the Eastern Caprivi in order to establish a reliable water stage-to-discharge relationship, and to carry out regular checking for hydrological monitoring of various sites.	Relationship between three rivers and area groundwater understood. Area of important aquifer defined. Use of artificial tracer technology transferred.
SUD/5/023	Improving Cotton and Sugar Cane Crops - Phase 2	To improve the yield, quality and diversity of crops through mutation breeding and in-vitro techniques.	Improved cotton mutants developed. Banana mutants with better yields identified in preliminary evaluation. Local capability in radiation mutation and in-vitro techniques enhanced.

## b) East Asia and the Pacific

Project Number	Project Title	Project Objectives	Summary Achievements
BGD/5/019	Extension Services to Farmers on Promising Mutant Varieties	To popularize promising mutant crop varieties among farmers.	Counterpart received training in extension programme organization and design. Mutant varieties showed improved yield. 20,000 kg of mutant seed varieties distributed to end users.
CPR/9/020	Severe Accident Analysis and Countermeasures for Qinshan NPP	To improve the existing Level 1 Probabilistic Safety Analysis (PSA) and extension into Level 2 for QNPP-1 and QNPP-2; to develop technical capability and technical bases for emergency operation and accident management procedures and guidelines for QNPP-1; and to establish severe accident analysis for QNPP.	Know-how transferred used in Qinshan-1 accident management strategy and Qinshan-2 design works. The analysis completed for 51 events. NPIC NPP Simulation Centre in use.
INS/7/003	Radiation Sterilization of Human Tissue Grafts	To establish tissue banks for radiation sterilization of biological tissue grafts for clinical and surgical applications.	Five tissue banks operational. National network of tissue banking established. Supply meets the demand.
MYA/6/020	Production of In-House Reagents for Radioimmunoassay	To establish production of in-house reagents for RIAs of growth hormone and human chorionic gonadotrophin, and to promote utilization of bulk reagent methodologies in RIAs in research and services to detect maternal and child health problems.	Capability to prepare in-house reagents developed. Cost for local production of RIA kits reduced.
PAK/5/033	Development of Leaf Curl Tolerant Varieties of Cotton	To develop cotton lines resistant to the cotton leaf curl virus with high yield and desired fibre quality.	Disease agent identified, cloned, and sequenced. Diagnostic tests for CLCuV developed. CLCuV-resistant cotton plants developed. Improved mutants grown in field trials.
PAK/6/014	PCR and DNA Probe Based Diagnosis of Infectious Diseases	To establish a reliable and rapid diagnostic test based on polymerase chain reaction and recombinant DNA for viral and bacterial diseases.	164 samples processed and results reported during project. Reliable and rapid diagnostic tests established.
RAS/5/030	Feed Supplementation and Animal Production Strategies	To demonstrate the benefits of feed supplementation strategies on livestock productivity at the farm level and to transfer the technologies to farmers.	UMMB supplementary feeding improved productivity. Benefits identified through UMMB feeding trials. UMMB replaced commercial concentrates in some countries.
SRL/9/008	Nuclear Techniques in Monitoring Industrial Pollution	To monitor radioactive background and heavy metal pollutants in the environment by using nuclear and related analytical techniques.	Two high-radiation areas identified. Assessment of heavy metal contamination of Beira Lake sediments completed. Results contributed to the restoration of Beira Lake.

## c) Europe

Project Number	Project Title	Project Objectives	Summary Achievements
ALB/6/007	Upgrading of a Centre for Nuclear Medicine	To upgrade nuclear medicine services by improving the facilities for patient care through provision of a gamma camera, and increasing the knowledge and skills of nuclear medicine staff.	Increase from 3,485 to 3,998 and from 0 to 2,707 of in vivo and in vitro procedures, respectively. Centre upgraded.
EST/6/002	Quality Assurance System in Radiotherapy and Nuclear Medicine	To establish a quality assurance system in radiotherapy for cancer patients.	Dosimetry practices revised at counterpart institutions. Quality control measurements performed on equipment.
GEO/9/003	Health Study of Persons Exposed to Radiation in Chernobyl	To study the health of Georgians participating in the liquidation work carried out in Chernobyl in conditions of chronic exposure to ionizing radiation.	Computer system granted for patient registration. Comprehensive follow-up of the health status of the targeted occupational group achieved.
GRE/5/018	Control of the Mediterranean Fruit Fly in Crete	To undertake a pilot field programme in Crete to control the Medfly through a sterile insect technique programme integrated with conventional methods.	Mass rearing systems improved. Pilot-scale SIT programme conducted.
LIT/0/002	Energy and Nuclear Power Planning Using IAEA Models	To use IAEA energy planning methodologies to assist the decision making process of the power sector concerning energy and electricity options.	Economic and environmental consequences of early closure of Ignalina NPP assessed. National team requested to analyze additional scenarios as well.
POL/4/011	Decommissioning Plan for EWA Research Reactor	To prepare the decommissioning plan for the EWA research reactor.	Counterpart carried out a majority of decommissioning. Low collective dose incurred.
POR/4/013	Gamma-Ray Spectrometry Applied to Environmental Monitoring	To strengthen the Environmental Monitoring System, both on the ground and airborne, by interdisciplinary use of gamma-ray spectrometry.	Existing EMS upgraded. Nation-wide data acquisition capability enhanced.
SLR/0/003	Upgrading NPP Personnel Training Programmes	To improve the operational safety and reliability of nuclear power plants by upgrading the training programmes of operational and maintenance staff.	New training material developed for Bohunice NPP. SAT methodologies established.
TUR/7/007	Radiation Sterilization of Tissue Grafts	To develop a national capability for radiation sterilization of human tissue grafts for safe and effective clinical application; to provide high quality grafts to the health care services; to support the technology through technical and promotional initiatives; and to establish a national tissue bank.	Tissue bank established. Workforce trained and prepared for tasks. Freeze-dried and radiation-sterilized bone or amnion grafts produced.

## d) Latin America

Project Number	Project Title	Project Objectives	Summary Achievements
ARG/2/008	Determining Toxic Elements in Medicinal Plants	To start production of a database on concentrations of toxic and other trace elements in medicinal plants.	Medicinal plants analyzed. Results introduced into a database. Counterpart used results for legislative purposes.
BRA/9/050	Licensing and Operational Safety of Nuclear Power Plants (Phase II)	To improve CNEN's regulatory practices through updated international experience.	ANGRA II commissioned in September 2000.
COL/5/017	Mutation Breeding of Plantain and Rice	To increase the genetic variability of rice and plantain for development of disease resistant and high yield varieties.	Counterpart interaction facilitated co-operation with local farmer organizations for testing, demonstrating, and release. Promising rice and plantain mutants developed.
CUB/8/016	Pollution and Transport of Pollutants in the Almendares River	To obtain precise data on the hydraulic and hydrochemical parameters governing movement, dispersion and mixing of water and contaminants in the Almendares River; to develop and validate a model for water quality simulation.	Infrastructure and expertise of counterpart enhanced. Results found that no amount of treatment would improve water quality of river, only increased flow, saving valuable financial resources.
ELS/8/006	Geochemical-Isotopic Evolutionary Study of Geothermal Fields	To integrate stable isotope techniques with regular geochemical and hydrogeological monitoring of the development of the Berlin and Ahuachapan geothermal fields.	Geochemical monitoring and reservoir modelling developed. Isotope laboratory of CEL capable of 53 measurements per month. Laboratory services provided to eight other Latin America countries.
MEX/7/008	Sterilization of Biological Tissue Using Ionizing Radiation	To produce radiation-sterilized tissue grafts and to establish a tissue bank.	Capability for production of radiation-sterilized tissue grafts and tissue bank established.
PAR/5/007	ELISA for Control and Eradication of Animal Diseases	To use ELISA (a) for diagnosis of brucellosis and foot and mouth disease (FMD) and to certify free-of-brucellosis areas and herds, and (b) to support control and eradication campaigns for brucellosis, FMD and other animal diseases.	More than 16,000 samples monitored for FMD virus. None found. Vaccination discontinued. Results reported to World Buiatric Congress.
RLA/2/007	Production and Control of Radiopharmaceuticals (ARCAL XV)	To establish production of selected radiopharmaceuticals in Latin America with a view to regional self-sufficiency.	More than 100 professionals trained in radiopharmaceutical procedures. Radiotherapeutic agents produced and distributed to other countries. Good manufacturing practices manual completed.
URU/8/011	Analysis of Heavy Metal Sediments in the Bay of Montevideo	To obtain data on the pollution level in sediments in the Bay of Montevideo and the Rio de la Plata to support decision making on remedial measures.	Lead-210 through polonium-210 levels determined routinely. Analytical resources used to model erosion patterns.

## e) West Asia

Project Number	Project Title	Project Objectives	Summary Achievements
IRA/5/011	Nuclear Techniques in Cereal Production	To develop advanced main cereal mutant lines with improved tolerance to biotic and abiotic stresses.	Improved mutant rice lines released. Disease-resistant mutant line in cotton developed.
IRQ/5/012	Improvement of Soil Fertility	To strengthen research and development activities for food production in saline soils through the application of radioisotopes and radiation technology.	Counterparts conducted studies. Fertigation trial held. Phosphate fertilizer developed and tested.
ISR/6/012	Brain SPECT Centre for Evaluation of Post-Trauma Injuries	To optimize brain SPECT technique by introducing a new dual-head SPECT camera and quality control parameters.	Capability to realign and superimpose the results of studies done on patients with brain injuries improved the diagnosis.
JOR/7/002	Cobalt Irradiation Facility - Phase 2	To initiate feasibility studies in radiation sterilization of medical supplies, in food preservation and in biotechnology applications.	Irradiator installed and tested. Medical products irradiated. Commercial use beginning.
KAZ/4/003	Cyclotron Production of Industrial and Medical Radioisotopes	To increase production of radioisotopes to meet increasing domestic needs of the nuclear medicine services and industry.	Current production levels for cobalt-57 and thallium-201 cover respectively 100% and 80% of the local demand.
KAZ/6/002	Upgrading Radiotherapy at National Institute of Oncology	To improve capability of the National Institute of Oncology at Almaty for performing safe and accurate radiotherapy.	Modern cobalt teletherapy unit provided. Dosimetry equipment enhanced treatment quality. Treatment of cancer patients increased.
LEB/5/013	SIT to Control Fruit Tree Pests	To continue proper field data collection in preparation for integrated Mediterranean fruit fly control; to train new staff and transfer mass-rearing technology to a refurbished laboratory.	SIT successfully transferred. Small-scale rearing and sterilization process established.
RAW/5/004	Support for Rinderpest Surveillance in West Asia	To establish and regionally co-ordinate the use of an ELISA based system for rinderpest seromonitoring and surveillance in support of national vaccination programmes to eradicate rinderpest from countries in West Asia.	Uniformity in performing validated standard assays by different countries established.

## 7. Global Indicators

157. As global indicators for assessment of programme performance, the quantifiable inputs supplied and the outputs delivered under the technical co-operation programme for 2000 are summarized below and described in more detail in the subsequent paragraphs. To complete the picture of global indicators, implementation rates are given at the very end of this section.

158. For the human resource components, delivery in non-financial terms in 2000 showed an increase throughout, except for training course participants, where the number was slightly below that for 1999. An analysis over the past five years shows that the average duration of personnel assignments has dropped by 38%. This is primarily due to the shorter average duration of fellowships. The delivery of more inputs and outputs in a shorter time is a clear indicator for gains in efficiency. Compared with last year, women's participation in TC activities has decreased slightly overall (to 19.1%), though there was an upwards trend in the number of women as international and national experts, meeting/workshop participants, and scientific visitors. The number of purchase orders for equipment was almost the same as in 1999, while the dollar value was lower.

### Experts and Meetings/Workshops

159. The total number of assignments fielded in 2000 was 5,874, an increase of 6% over 1999. These assignments consisted of various types: international experts, training course lecturers, national experts, meeting/workshop participants, and other project personnel (such as technical/support staff).

Year	New obligations \$ million	Number of persons	Number of assignments	Number of months
1996	13.4	2,367	3,610	1,302
1997	14.2	2,777	4,184	1,403
1998	11.4	2,753	4,111	1,296
1999	15.4	3,743	5,511	1,690
2000	17.0	3,848	5,874	1,707

160. Although the growth in numbers was less spectacular than the one observed in 1999, the slight upwards trend in assignments of meeting/workshop participants in 2000 confirms the popularity and effectiveness of meetings/workshops as fora for information exchange and problem resolution amongst peers, and shows that interaction within the geographical regions is strengthening. The most striking increase in 2000 was in the number of assignments of national experts, indicating that interaction with the Agency's counterparts at the national level has also been strengthened.

Assignment type	1998	1999	2000
International experts	2,034	2,365	2,513
Lecturers	506	519	537
National experts	205	294	433
Meeting/workshop participants	1,363	2,323	2,379
Other project personnel	3	10	12

161. As an indicator of co-operation within the different geographical regions, the share of assignments carried out in 2000 by professionals from a given region to another country in the same region was as follows: Africa, 28%; East Asia and the Pacific, 45%; Europe, 76%; Latin America, 56%; and West Asia, 5%.

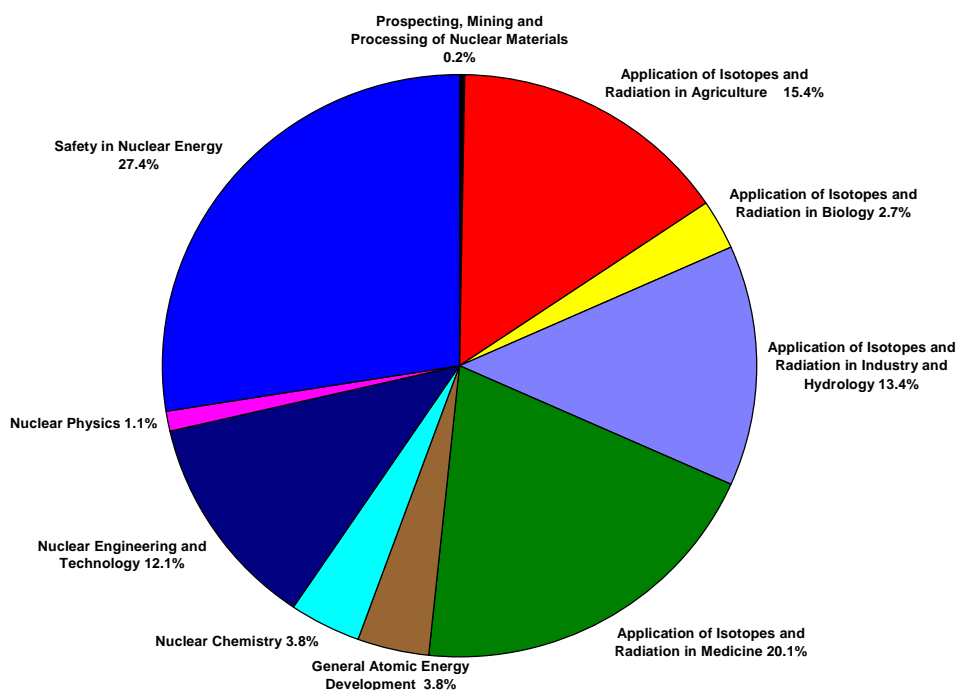
162. Details on the origin of the individuals who undertook the assignments and details on the countries/regions which received the assignments are given in Tables C.1 and C.2, respectively, of the Supplement to this report.

### Technical Co-operation Trainees

163. In 2000, 1,637 persons received training through fellowships and scientific visits, and 2,263 through training courses. Details on where the trainees came from and where they received the training are shown in Table C.4 of the Supplement to this report.

164. The illustration below shows that the principal fields of training were nuclear safety and nuclear medicine.

**TRAINING BY FIELD OF ACTIVITY: 2000**



165. Compared with last year, the number of fellows and scientific visitors has gone up by 18.5%. The average duration of a fellowship in 2000 was 2.8 months.

Year	New obligations \$ millions	Number of fellows	Number of fellowship months	Number of scientific visitors	Number of scientific visitor months
1996	9.8	1,032	3,490	358	190
1997	8.1	862	2,626	361	183
1998	9.8	998	2,700	337	157
1999	9.8	1,015	2,682	366	165
2000	10.8	1,203	3,409	434	189

166. Twenty-seven fellows received 85 months of training through what are called type II fellowships, i.e., fellowships that are totally or partially funded by the host country. As shown in the following table, the estimated value of this cost-free training was \$353,700 contributed by three Member States.

Donor	Number of fellows in the field	Number of months of training	Monetary value (\$)
Spain	2	5	15,180
United Kingdom	6	14	59,220
United States of America	19	66	279,300
TOTAL	27	85	353,700

167. As shown below, the number of participants in regional and interregional training courses was slightly lower (by 2.6%) than in 1999, while the number of courses remained the same. Of the total 162 courses, 13 were at the interregional level and 149 at the regional level. Included in this number are events under the Regional Co-operative Agreements: 40 under the RCA, 19 under the ARCAL, and 17 under the AFRA programme. In line with a request by the Board of Governors, the year 2000 was the last year in which courses were held under the Regular Training Courses Programme, and 18 of these took place. The vast majority (144) of training courses in 2000 was within the framework of TC projects.

168. In addition to the 162 interregional and regional training courses, 22 national events were implemented.

Year	New obligations \$ millions	Number of courses	Number of participants	Number of months
1996	8.6	122	1,718	1,138
1997	7.3	122	1,752	1,049
1998	7.6	160	2,012	885
1999	8.3	162	2,324	1,136
2000	8.3	162	2,263	1,092

## Equipment

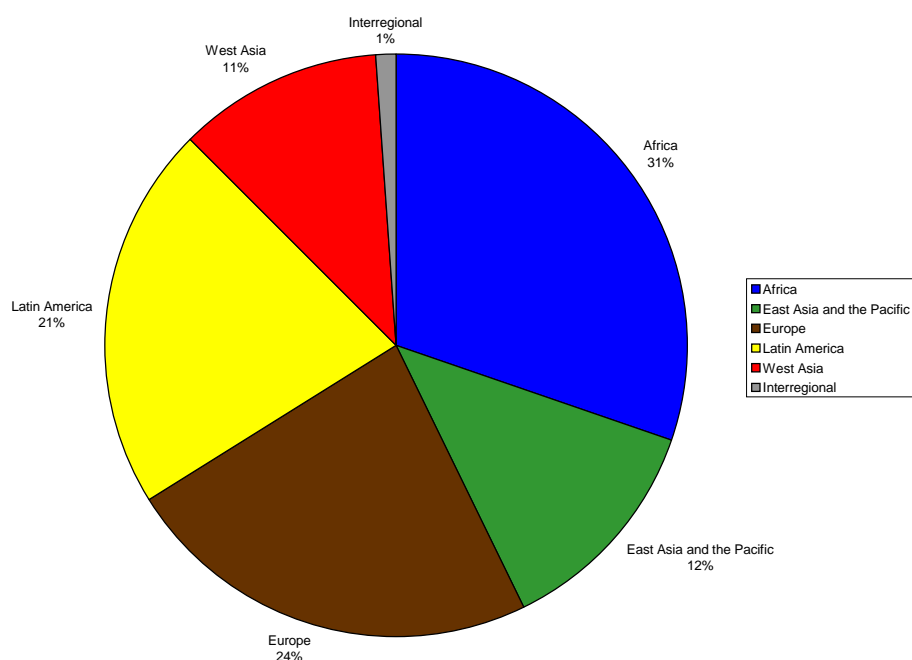
169. The number of purchase orders was marginally higher than in 1999, while actual disbursements for equipment procured under the technical co-operation programme went down by \$5.2 million. The percentage of disbursements on equipment stood at 42.6% in 2000 (versus 47.4% in 1999). Disbursements were lower due to the fact that (a) significant savings were made due to the strong dollar, and (b) an especially large amount was obligated in the last quarter of 2000, for which payments would only be effected in early 2001.

Year	New obligations \$ millions	Disbursements \$ millions	Number of purchase orders *
1996	25.0	23.1	3,919
1997	28.8	28.1	4,444
1998	28.5	30.1	3,952
1999	25.5	30.4	3,950
2000	27.8	25.2	3,961

\* including training course equipment and research contract orders

170. As illustrated in the figure below, the highest amount of disbursements on equipment was for the Africa programme.

**Equipment Disbursements by Area**



171. Equipment categories that saw purchase orders for amounts exceeding \$2 million included: laboratory equipment and supplies, radiation monitoring instruments, and nuclear medicine equipment. Procurement from developing countries was at 14.5%, an achievement

which was due in part to the high volume of orders from Chile (analysis of biological samples), China, Czech Republic, Guatemala (fly pupae), Hungary, and South Africa.

172. For perishable items such as immunoradiometric assay and radioimmunoassay reagent kits, a new “call-off order” or “pull” method was introduced on a trial basis. Under this method, the Agency negotiated a fixed price for the item, issued an order for the expected quantity for one year for the intended recipients, and instructed project counterparts to arrange individual deliveries of the required quantity directly with the supplier as needed. It is expected that this method will help reduce the loss of valuable material as recipients will always be immediately aware of every shipment.

173. Details on equipment by country of origin are shown in Table C.5 of the Supplement to this report.

## IMPLEMENTATION SUMMARY

(as of 31 December 2000)

Recipient	Adjusted programme (\$)	New obligations (\$)	Implementation rate (%)	Earmarkings (\$)
<b>Africa</b>				
Algeria	897,917	591,465	65.9%	306,452
Angola	49,400	30,842	62.4%	18,558
Burkina Faso	48,000	26,770	55.8%	21,230
Cameroon	267,651	178,373	66.6%	89,278
Cote d'Ivoire	139,376	115,239	82.7%	24,137
Democratic Republic of the Congo	305,659	205,773	67.3%	99,885
Egypt	702,376	447,301	63.7%	255,075
Eritrea	17,900	16,795	93.8%	1,105
Ethiopia	1,583,475	1,009,705	63.8%	573,770
Gabon	75,409	34,424	45.7%	40,985
Ghana	483,753	429,067	88.7%	54,687
Kenya	212,221	94,900	44.7%	117,321
Libyan Arab Jamahiriya	548,062	171,759	31.3%	376,303
Madagascar	358,390	303,769	84.8%	54,621
Mali	308,403	241,667	78.4%	66,736
Mauritius	551,524	379,247	68.8%	172,277
Morocco	951,866	765,188	80.4%	186,678
Namibia	369,084	346,960	94.0%	22,125
Niger	325,818	190,345	58.4%	135,473
Nigeria	654,840	498,654	76.1%	156,186
Regional Africa	10,088,918	8,128,153	80.6%	1,960,765
Senegal	256,146	185,999	72.6%	70,147
South Africa	651,745	549,089	84.2%	102,656
Sudan	246,528	222,933	90.4%	23,595
Tunisia	536,033	434,303	81.0%	101,730
Uganda	253,484	146,916	58.0%	106,569
United Republic of Tanzania	416,949	311,868	74.8%	105,081
Zambia	110,502	62,569	56.6%	47,933
Zimbabwe	181,865	75,420	41.5%	106,445
<b>Area Total</b>	<b>21,593,295</b>	<b>16,195,493</b>	<b>75.0%</b>	<b>5,397,802</b>
<b>East Asia and the Pacific</b>				
Bangladesh	939,741	785,723	83.6%	154,018
China	2,090,065	1,262,229	60.4%	827,836
Indonesia	672,587	471,708	70.1%	200,879
Korea, Republic of	575,363	435,593	75.7%	139,770
Malaysia	571,335	398,011	69.7%	173,324
Marshall Islands	2,300	2,250	97.8%	50

Recipient	Adjusted programme (\$)	New obligations (\$)	Implementation rate (%)	Earmarkings (\$)
Mongolia	617,610	468,894	75.9%	148,716
Myanmar	430,172	252,890	58.8%	177,283
Pakistan	1,299,695	816,679	62.8%	483,016
Philippines	353,674	295,108	83.4%	58,566
Regional East Asia and the Pacific	9,352,737	6,509,578	69.6%	2,843,159
Sri Lanka	702,182	511,019	72.8%	191,164
Thailand	701,637	517,152	73.7%	184,484
Viet Nam	1,109,628	771,103	69.5%	338,525
<b>Area Total</b>	<b>19,418,726</b>	<b>13,497,936</b>	<b>69.5%</b>	<b>5,920,789</b>
<b>Europe</b>				
Albania	277,724	195,680	70.5%	82,045
Armenia	746,557	634,331	85.0%	112,226
Belarus	1,172,896	810,942	69.1%	361,954
Bosnia and Herzegovina	286,173	248,008	86.7%	38,165
Bulgaria	1,083,432	656,242	60.6%	427,190
Croatia	151,387	125,591	83.0%	25,795
Cyprus	20,363	20,135	98.9%	228
Czech Republic	224,468	184,493	82.2%	39,975
Estonia	5,830	5,830	100.0%	0
Georgia	449,324	267,786	59.6%	181,538
Greece	203,324	116,337	57.2%	86,987
Hungary	270,054	231,756	85.8%	38,298
Latvia	175,552	175,851	100.2%	-299
Lithuania	121,903	109,325	89.7%	12,577
Malta	49,464	49,483	100.0%	-19
Poland	631,127	565,730	89.6%	65,397
Portugal	117,091	101,166	86.4%	15,925
Regional Europe	8,068,140	6,929,500	85.9%	1,138,640
Republic of Moldova	52,791	20,820	39.4%	31,970
Romania	843,108	542,070	64.3%	301,039
Russian Federation	108,191	41,009	37.9%	67,182
Slovakia	691,290	645,858	93.4%	45,433
Slovenia	316,349	280,090	88.5%	36,260
The former Yugoslav Republic of Macedonia	330,016	293,645	89.0%	36,371
Turkey	202,781	152,930	75.4%	49,852
Ukraine	1,699,592	1,337,847	78.7%	361,745
<b>Area Total</b>	<b>18,298,928</b>	<b>14,742,457</b>	<b>80.6%</b>	<b>3,556,471</b>
<b>Latin America</b>				
Argentina	601,196	519,784	86.5%	81,413

Recipient	Adjusted programme (\$)	New obligations (\$)	Implementation rate (%)	Earmarkings (\$)
Bolivia	834,463	745,356	89.3%	89,107
Brazil	819,110	679,793	83.0%	139,316
Chile	572,561	504,747	88.2%	67,814
Colombia	467,872	367,977	78.6%	99,895
Costa Rica	291,141	194,875	66.9%	96,266
Cuba	583,783	513,382	87.9%	70,401
Dominican Republic	399,693	332,323	83.1%	67,370
Ecuador	217,719	171,762	78.9%	45,956
El Salvador	84,781	63,413	74.8%	21,368
Guatemala	111,583	96,650	86.6%	14,934
Jamaica	380,162	359,559	94.6%	20,602
Mexico	681,787	572,490	84.0%	109,297
Nicaragua	78,807	55,621	70.6%	23,187
Panama	40,224	32,112	79.8%	8,111
Paraguay	57,104	49,166	86.1%	7,937
Peru	732,104	535,757	73.2%	196,347
Regional Latin America	6,678,124	5,584,129	83.6%	1,093,995
Uruguay	290,407	192,984	66.5%	97,423
Venezuela	217,490	122,760	56.4%	94,731
<b>Area Total</b>	<b>14,140,111</b>	<b>11,694,641</b>	<b>82.7%</b>	<b>2,445,470</b>
<b>West Asia</b>				
Iran, Islamic Republic of	982,675	784,012	79.8%	198,663
Iraq	328,215	108,875	33.2%	219,339
Israel	314,666	271,358	86.2%	43,309
Jordan	467,925	431,814	92.3%	36,111
Kazakhstan	741,844	610,280	82.3%	131,564
Kuwait	33,510	0	0.0%	33,510
Lebanon	262,466	190,749	72.7%	71,717
Regional West Asia	2,859,632	2,700,084	94.4%	159,547
Saudi Arabia	109,492	42,112	38.5%	67,380
Syrian Arab Republic	789,491	573,776	72.7%	215,715
Territories under the Jurisdiction of the Palestinian Authority	286,521	192,476	67.2%	94,045
United Arab Emirates	3,139	0	0.0%	3,139
Uzbekistan	273,481	191,749	70.1%	81,732
Yemen	62,899	60,573	96.3%	2,326
<b>Area Total</b>	<b>7,515,954</b>	<b>6,157,858</b>	<b>81.9%</b>	<b>1,358,097</b>
Global	600,000	529,135	88.2%	70,865
Interregional	4,352,616	3,177,948	73.0%	1,174,668
<b>Overall Total</b>	<b>85,919,629</b>	<b>65,995,466</b>	<b>76.8%</b>	<b>19,924,163</b>

## PART III: RESOURCES AND DELIVERY

### 1. Overview

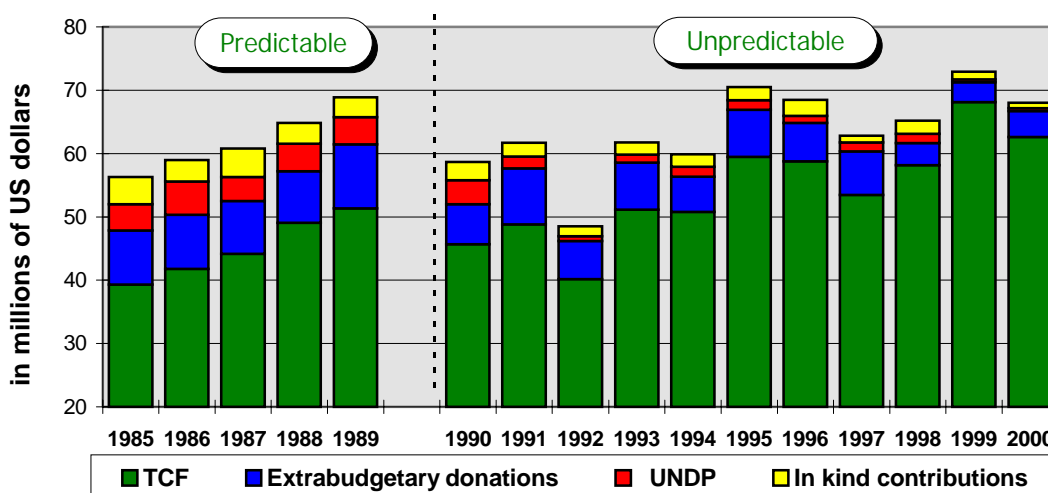
#### TC PROGRAMME 2000 (as of 31 December 2000)

<i>New resources</i>	\$68.0 million
<i>Adjusted programme</i>	\$85.9 million
<i>New obligations</i>	\$66.0 million
<i>Implementation rate</i>	76.8%
<i>Disbursements</i>	\$59.1 million

174. New resources for 2000 for the Technical Co-operation programme equalled \$68 million, the second largest amount to date. As reported last year, the \$71.9 million received in 1999 was extraordinarily high due to the payment of \$9.3 million by one new major donor. Total resources were almost entirely made up of funds from the Technical Co-operation Fund (TCF) (92.1%) and extrabudgetary sources (6.0%); United Nations Development Programme (UNDP) funding and in-kind resources have both dropped to below \$1 million and now combined make up less than 2% of resources.

175. Continuing the practice of the last few years, a comparison of each year's new resources over time can be made with the inclusion of an inflation factor. The adjustment was made using the consumer price inflation rate for the OECD area, which was 1.4% for 1999. As can be seen in Figure 1, the unpredictability of resources continued into the year 2000. It is expected that the resources for the coming years will continue to increase, with moderate gains for the TCF and somewhat higher increases for extrabudgetary contributions.

Figure 1. IAEA TC RESOURCES ADJUSTED FOR INFLATION: 1985-2000\*



\* All figures prior to 2000 adjusted to 2000 dollars.

176. Total resources for the technical co-operation programme increased from the 1997-1998 biennium to the 1999-2000 biennium by \$17.5 million or around 14.3%, well above the

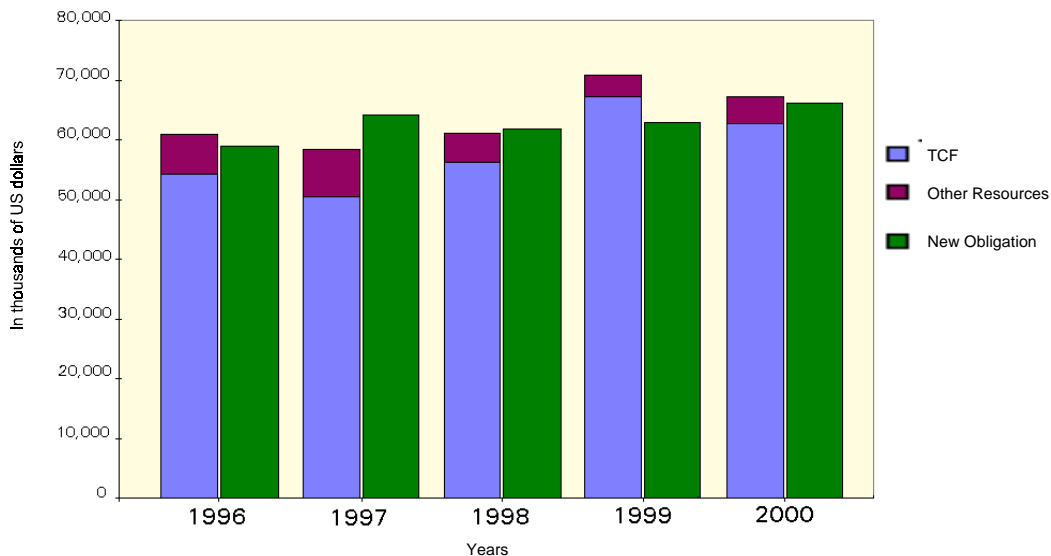
rate of inflation. The year 2000 ended with a surplus of funds so that with the expected new resources in both the TCF and extrabudgetary categories, another increase in total resources available for the technical co-operation programme can be anticipated for the coming biennium.

177. The total adjusted programme, representing the budgets of all projects being implemented during the year, was \$85.9 million at year end, or approximately 3.5% more than at the end of the previous year. The adjusted programme varies during the year due to a number of factors such as the approval of programming reserve activities, the upgrading of footnote-a/ projects from both TCF and extrabudgetary sources, rephasing of project budgets into future years and from future years into the current year, and with the addition and subtraction of amounts from ongoing project budgets. At the beginning of 2000, the programme was \$86.7 million. The programme development during the year was different for each region: Africa increased by 12.7%; East Asia and the Pacific increased by 10.9%; Europe stayed almost constant with a slight increase of 0.3%; Latin America decreased by 8.7%; and West Asia decreased sharply by 19.8%; as did the Interregional programmes by 17.5%.

178. New obligations are a measure of implementation of project activities. They comprise payments and new commitments made during the year less outstanding obligations from previous years. In 2000 new obligations were nearly \$4 million more than in 1999, with a total of \$66 million being recorded. The implementation rate, which compares new obligations with the total adjusted programme, reached 76.8%, an increase of nearly 2% over the rate achieved in 1999.

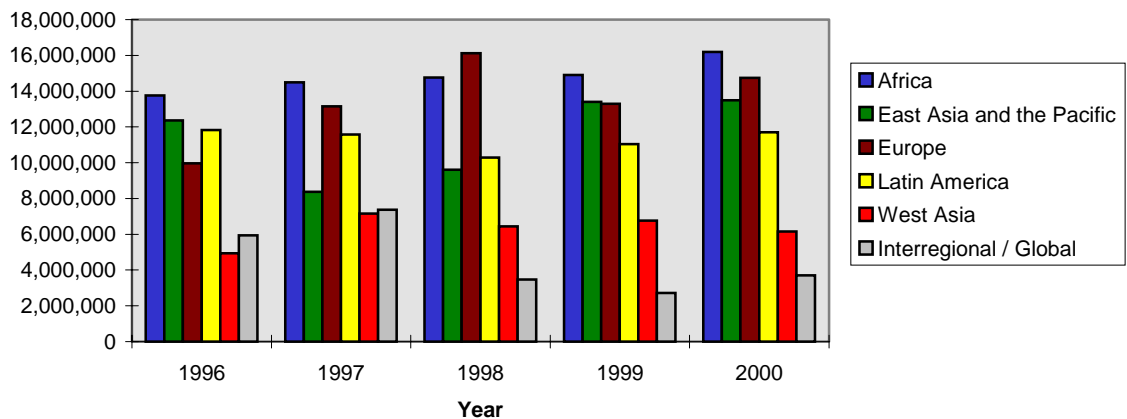
179. Figure 2 provides a yearly comparison of new obligations with new resources from all funds. As shown below, new obligations were higher than new resources in 1997 and 1998, and slightly lower in 1996 and 2000. The one year in which obligations were much lower than resources was 1999, when an extraordinarily large contribution was made by one Member State at the end of the year.

**Figure 2. COMPARISON OF NEW RESOURCES WITH NEW OBLIGATIONS: 1996 - 2000**



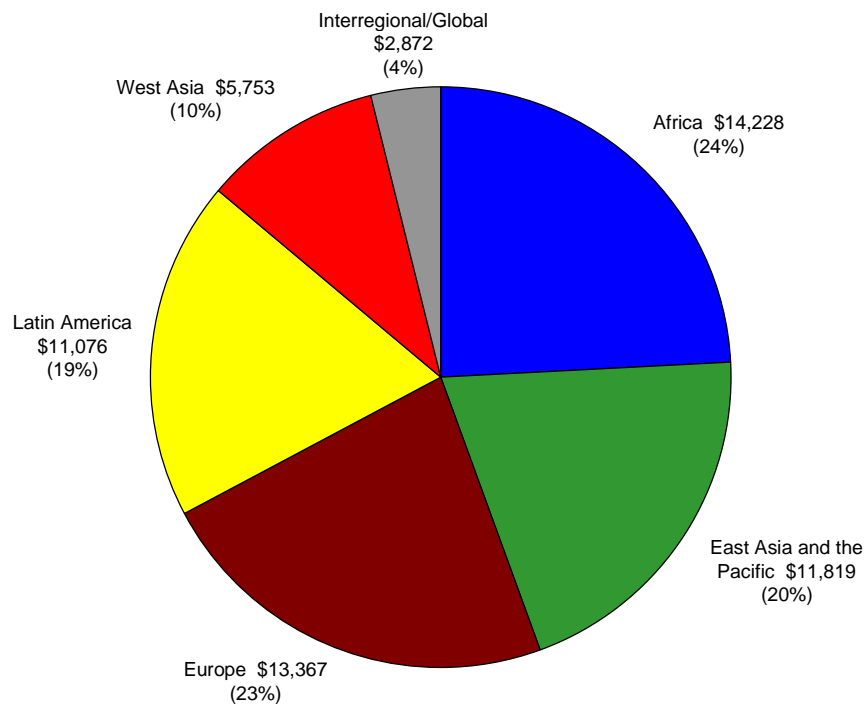
180. Figure 3 gives a breakdown of new obligations by region over a five-year period. It can be seen that for four of the past five years, Africa has accounted for the largest part of the programme implemented.

**Figure 3. NEW OBLIGATIONS BY REGION: 1996 - 2000**



181. Disbursements are a measure of the delivery of project outputs to Member States. As shown in Figure 4, the largest share this year went to Africa, with 24%, which represented an increase of one percentage point over 1999. The shares of Europe, with 23%, East Asia and the Pacific, with 20%, and Latin America, with 19%, were much closer to each other this year than last year. West Asia, with 10% of the programme and Interregional/Global with 4% were very close to last year's numbers.

**Figure 4. DISBURSEMENT BY REGION: 2000**

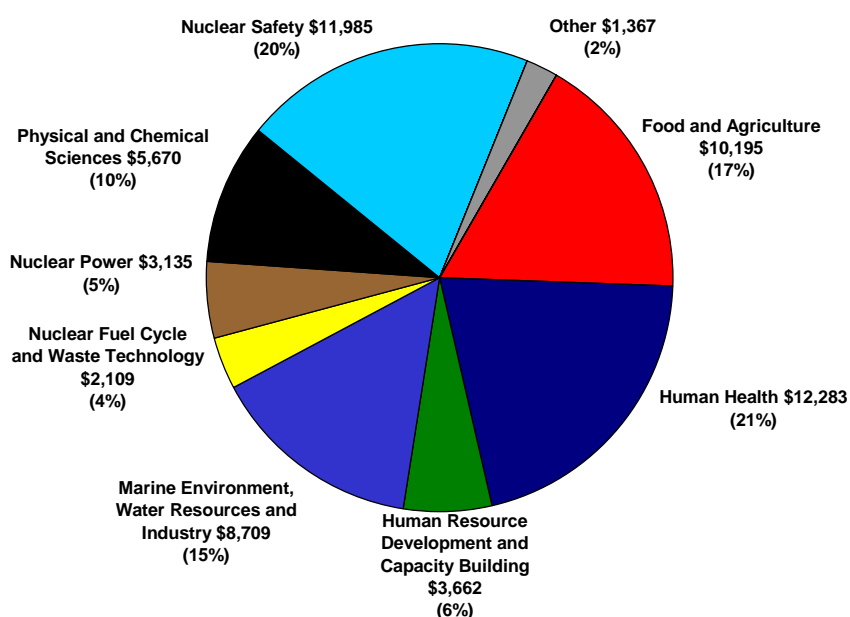


182. Total disbursements were down to \$59.1 million in 2000, \$4.9 million less than in 1999, which seems somewhat surprising, given the fact of the higher obligations already noted. This was attributable to the start-up problems of the new accounting system and the

difficult interface with the travel system. Furthermore, a high volume of obligations were made towards the year end, and these will only be liquidated in the first half of 2001.

183. The distribution of the disbursements by Agency Programme shows very little change from rankings of last year: Human Health again accounted for the largest share with 21% followed closely by Nuclear Safety with 20%. Food and Agriculture accounted for 17%, Marine Environment, Water Resources, and Industry for 15%, and Physical and Chemical Sciences for 10%. Nuclear Power had 5% of disbursements, Nuclear Fuel Cycle and Waste Technology 4%, Human Resource Development and Capacity Building 6% and four minor themes comprised around 2%.

**Figure 5. DISBURSEMENT BY PROGRAMME: 2000**



## 2. Technical Co-operation Fund

184. Pledges to the TCF for 2000 were \$57,971,951. This represented 79.4% of the \$73,000,000 target. Including other income, total income to the fund was \$62,626,994. While this was lower than in 1999, it still represents the second highest percentage of the target achieved during the last 10 years.

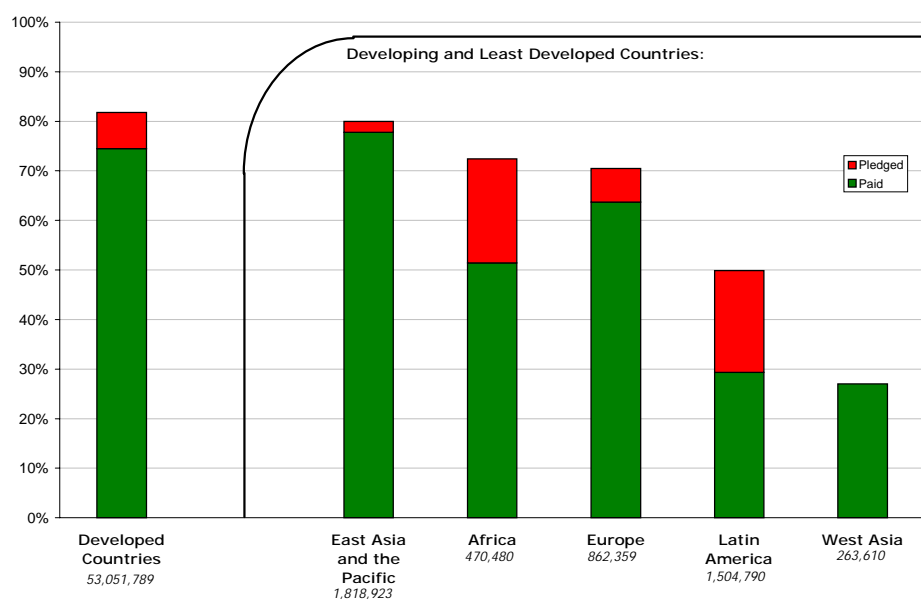
185. The number of Member States pledging in 2000 was 75, which was two more than in the previous year. Twenty-two developed countries out of 28 pledged (79%), and for the developing countries, the number was 53 out of a possible 102. The differences by area were noteworthy: from the East Asia and Pacific Member States, 69% pledged; from Europe, 65%; from West Asia, 54%; from Africa, 43%; while for Latin America, only 7 out of 20, or 35% of Member States pledged.

186. In dollar terms, the picture is somewhat different, as depicted in Figure 6 below. The total share of the target for developed Member States was \$64,866,340, of this amount 82% was pledged and 75% was paid by year end. The percentages of pledges and payments by

developing countries were: Africa, 72% pledged, 51% paid; East Asia and the Pacific, 80% pledged, 78% paid; Europe, 70% pledged, 64% paid; Latin America, 50% pledged, 29% paid; and West Asia 27% pledged and paid.

**Figure 6. TCF PLEDGES AND PAYMENTS: 2000**

(as of 31 December 2000)



187. The 20 largest contributors to the TCF are listed in the Table 1. It is noteworthy that two of the top five contributors from 1999 do not appear here this year. Italy, which contributed 240% of its share in 1999, did not contribute in 2000. France, which pledged its full share of \$4,715,800, made its payment in early 2001.

**Table 1. TCF PAYMENTS: 2000**

(as of 31 December 2000)

Member State	Payments (\$)	Percentage of total payments
United States of America	18,092,000	34.5
Japan	14,409,470	27.5
United Kingdom	3,670,440	7.0
Germany	2,828,896	5.4
Canada	1,581,081	3.0
Netherlands	1,176,030	2.2
Russian Federation	1,072,370	2.0
Australia	980,392	1.9
Switzerland	876,000	1.7
Sweden	781,830	1.5
Mexico	706,640	1.3
China	701,530	1.3
Austria	678,170	1.3
Denmark	497,860	1.0
Norway	439,460	0.8
Korea, Republic of	414,043	0.8
Finland	390,550	0.7
Spain	335,811	0.6
Turkey	317,550	0.6
Belgium	235,575	0.4
Sub-total	50,185,698	95.8
Others	2,181,216	4.2
Total	52,366,914	100.0

188. The Agency uses "overprogramming", by which the total value of approved project budgets is greater than the total resources available at that time, as a tool to ensure optimum use of resources. The year 2000, the second in the biennial cycle, started with a much smaller overprogramming amount than originally foreseen, namely 6.8%. During the first two quarters, a number of footnote-a/ projects were upgraded and additional funds were provided to ongoing activities so that the overprogramming reached 12.8% by mid year. In the third quarter, during final preparations for the new cycle 2001-2002, a thorough review of all ongoing projects was made, and a number of budget rephasings were carried out to bring the budgets in line with the possible implementation for the rest of the year. At the end of September, the overprogramming rate stood at only 3.9%. In the last quarter, there were two developments that affected the balance between available resources and total commitments. First, the Agency received a substantial payment from the Russian Federation, which paid not only its full share for 2000, but also pledged and paid for earlier years as well; and second, a further reduction was made in the still ongoing programme. Therefore, the year 2000 ended unexpectedly with an underprogramming of \$2,691,000 or 3.3% (see Table 2 below).

**Table 2. TOTAL RESOURCES AVAILABLE AND PROGRAMME COMMITMENTS  
AT YEAR END**

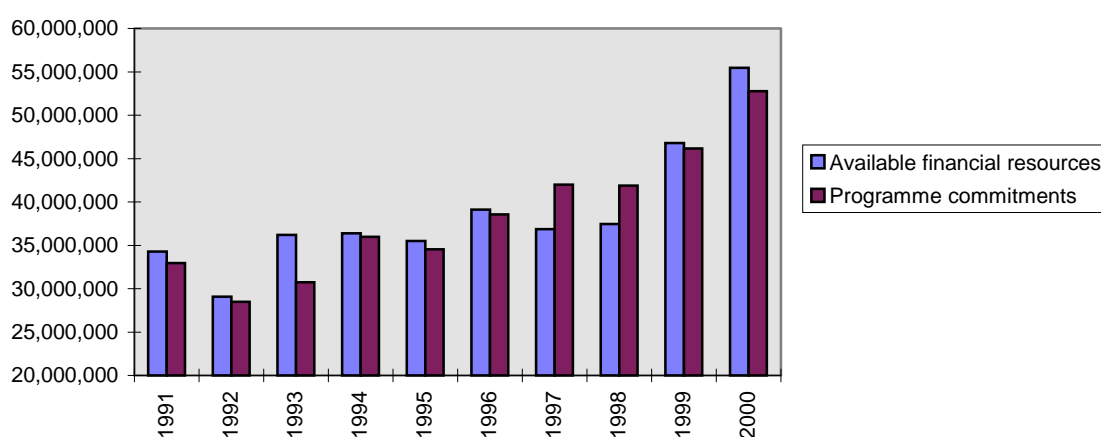
Year	Available financial resources <sup>a)</sup>	Programme commitments <sup>b)</sup>	(Overprogramming) underprogramming
1991	34,292,000	32,966,000	1,326,000
1992	29,069,000	28,490,000	579,000
1993	36,187,000	30,751,000	5,436,000
1994	36,369,000	35,988,000	381,000
1995	35,512,000	34,552,000	960,000
1996	39,099,000	38,566,000	533,000
1997	36,868,000	41,997,000	(5,129,000)
1998	37,467,000	41,894,000	(4,427,000)
1999	46,800,000	46,164,000	636,000
<b>2000</b>	<b>55,444,000</b>	<b>52,753,000</b>	<b>2,691,000</b>

a) Total resources for the year less disbursements.

b) Total of current year unliquidated obligations and current year earmarkings.

189. As can be seen in Table 2 and in Figure 7, the overprogramming/underprogramming balance shifted at the end of the year to excess funds, and the amount remaining unprogrammed in December 2000 was the second largest in the last decade. The Secretariat will monitor this carefully in 2001 and will be able, within the context of the dynamic programming mechanism approved by the Board, to use available funds during the first half of 2001 to upgrade a number of footnote-a/ projects.

**Figure 7. TOTAL RESOURCES AVAILABLE AND PROGRAMME COMMITMENTS  
AT YEAR END**



190. The assessed programme costs (APCs), which are paid by the recipient Member States, are levied at 8% of the total assistance received during the previous year through national projects, fellowships, and scientific visits. The total amount billed in 2000 for the year

1999 equalled \$2,334,000, and of this \$1,276,000 or 55% had been paid by year end. In addition, \$1,450,000 was paid against earlier years' outstanding amounts. The total payments, in excess of \$2.7 million, were considerably higher than the \$2.2 million paid in the previous year. The overall outstanding amount at year end stood at \$7,066,000, a reduction of about \$391,000 in comparison with the end of 1999. More detailed information on APCs is provided in Table A.4 in the Supplement.

191. In spite of higher payments, the Secretariat, in co-operation with the recipient Member States, is working to reduce the large backlog of APCs due. The Contributions Unit of MTBF is developing a facility to allow Member States with significant arrears to pay them off over a number of years. With this new initiative, it is hoped that with time the backlog can be substantially reduced.

192. As shown in Table 3, the unobligated balance stood at \$19.9 million at year end; however, it is interesting to note that the usable unobligated balance decreased by \$3,601,000 to \$8,095,000.

**Table 3. CALCULATION OF THE USABLE UNOBLIGATED BALANCE**

	1996	1997	1998	1999	2000
Unobligated balance all years	15,528,000	9,415,000	10,161,000	18,403,000	<b>19,901,000</b>
Pledges not yet paid	(3,827,000)	(3,442,000)	(2,400,000)	(2,877,000)	<b>(6,894,000)</b>
Non-convertible currencies which cannot be utilized	(1,707,000)	(1,770,000)	(1,706,000)	(1,495,000)	<b>(1,631,000)</b>
Currencies which are difficult to convert and can only be utilized slowly	(3,139,000)	(3,208,000)	(2,611,000)	(2,335,000)	<b>(3,281,000)</b>
Resources which can be used for TC programme obligations	6,855,000	995,000	3,444,000	11,696,000	<b>8,095,000</b>

### **3. Extrabudgetary Funds**

#### **Funds from Member States**

193. New extrabudgetary resources from 22 Member States and one international organization, including Government cost sharing of \$800,000, amounted to \$4.1 million in 2000, an increase of \$1 million compared with 1999. Table A.5 in the Supplement provides a detailed breakdown of these resources. The increase is mainly due to higher contributions from Japan, Spain, and the USA. This category of funds represented 6% of all new technical co-operation resources and 8.5% of the adjusted programme. As in 1999, the implementation rate reached 61%.

194. Of the extrabudgetary resources, \$3.6 million were used to upgrade footnote-a/ projects and project components. In addition, \$2.4 million of the TCF were used to finance footnote-a/ activities, bringing the total to \$6.0 million. This meant that the Agency was able to fund about 24% of the total footnote-a/ programme of \$25.2 million approved by the Board for 2000.

195. Extrabudgetary resources were allocated to national projects in 17 recipient countries. In addition, regional projects were supported by contributions from 11 donors, as shown in Table 4.

**Table 4. SUPPORT TO TC REGIONAL PROJECTS IN 2000 BY DONOR**

Donor	Africa	East Asia and the Pacific	Europe	Latin America
Australia		X		
Chile				X
China		X		
Finland			X	
France				X
Indonesia		X		
Japan		X		
Korea, Republic of		X		
Malaysia		X		
OPEC Fund	X			
USA	X		X	X

196. Negotiations with the United States Agency for International Development (USAID) were for the provision of a \$2.5 million grant over three years for a project benefiting Israel, Jordan, and the Territories under the Jurisdiction of the Palestinian Authority. Field activities for this project aim to expand regional efforts to control the Mediterranean fruit fly (Medfly) using the sterile insect technique (SIT).

197. The Agency explored opportunities for co-financing projects with the Common Fund for Commodities (CFC), and the initial contacts were encouraging. The CFC is an autonomous intergovernmental development financing institution established within the framework of the United Nations. CFC-funded projects aim to reduce poverty through commodity development, in particular in the least developed countries (LDCs). Preference is given to projects that contain demonstrative and replicable measures for transferring technology, promote investment in new end-use areas, and/or disseminate research and development findings.

198. As mentioned last year, efforts to secure additional extrabudgetary funds were constrained by the existing rules regarding the acceptance of voluntary contributions of money to the Agency. As reported in Part I, the Secretariat has responded to the request made by the 44<sup>th</sup> General Conference (GC(44)/RES/18) by holding discussions with Member States on this subject. The Secretariat will propose changes to these rules in order to facilitate partnerships with non-traditional donors.

## **UNDP**

199. Four UNDP projects which were operational during 2000 are nearing completion. No new budgets have been approved for them for 2001, and it is expected that financial and technical closure will be realized by the end of the year. However, two new projects are currently undergoing final preparation for UNDP/Global Environmental Facility funding, which is expected before the end of 2001. These projects are both in water resource management involving the Dnieper River in Ukraine and Guarani aquifer in South America.

200. The four projects nearing completion provided assistance in a wide range of topics. One project, "Better Management of the Environment and Industry through Isotope and Radiation Technology", provided a key impetus to a number of subprojects being conducted under the Regional Co-operative Agreement for East Asia and the Pacific. Funding for these

projects will be continuing from the IAEA and a number of extrabudgetary donors, particularly Members States from the East Asia and the Pacific region.

201. In the Syrian Arab Republic, some \$2.3 million of UNDP resources were used over the last five years in a project to upgrade the technical capabilities for purifying phosphoric acid for production of Triple Super Phosphate (TSP), which is produced in Homs, Syrian Arab Republic. In Russia, the IAEA has been serving as associated agency in the implementation of a larger UNDP-funded project with responsibility for activities to assess the radionuclide pollution in the Bryanskaya Oblast region, particularly with regard to water resources. In Eritrea, a UNDP Technical Support Services project used IAEA expertise to assess the nation's livestock disease control programme, particularly with regard to the elimination of rinderpest.

#### **4. In-Kind Contributions**

202. Credit for assistance in-kind is traditionally given to donors for the following: the fully or partially cost-free provision of experts' and training course lecturers' services in countries other than their own; the sponsorship of foreign training course participants; fellowship training at little or no cost (type II fellowships); and equipment donated to and actually received by another Member State.

203. In-kind assistance in 2000 amounted to a total value of \$872,737 and comprised 251 assignments of experts and training course lecturers provided partially or fully cost-free by 39 Member States and seven international organizations, and 85 months of type II resources for fellowship training in three countries. The decrease in value over the previous year is principally due to the fact that 2000 saw no equipment donations.

204. Details on all in-kind contributions are shown in Table A.6 of the Supplement to this report.

## ABBREVIATIONS and ACRONYMS

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<b>AEOI</b>	Atomic Energy Organization of Iran (Islamic Republic of Iran)
<b>AFRA</b>	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
<b>AFROG</b>	African Radiation Oncology Group
<b>ALARA</b>	As low as reasonably achievable
<b>APC</b>	Assessed programme costs
<b>APO</b>	Asia Productivity Organization
<b>ARCAL</b>	Acuerdo Regional de Cooperación para la Promoción de la Ciencia y Tecnología Nucleares en América Latina y El Caribe - Regional Co-operative Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean
<b>BNPP</b>	Bushehr Nuclear Power Plant (Islamic Republic of Iran)
<b>BRIT</b>	Board of Radiation and Isotope Technology (India)
<b>BSS</b>	Basic Safety Standards
<b>CANDU</b>	Canada deuterium-uranium (reactor)
<b>CBPP</b>	Contagious bovine pleuropneumonia
<b>CCA</b>	Common Country Assessment
<b>CDM</b>	Clean Development Mechanism
<b>CDTN</b>	Centro de Desenvolvimento da Tecnologia Nuclear - Centre for the Development of Nuclear Technology (Brazil)
<b>CEL</b>	Comision Ejecutiva Hidroeléctrica del Río Lempa- Hydroelectric Executive Commission for Río Lempa (El Salvador)
<b>CEMIG</b>	Companhia Energetica do Estado de Minas Gerais - Energy Utility of the State of Minas Gerais (Brazil)
<b>CFC</b>	Common Fund for Commodities
<b>CIAE</b>	China Institute of Atomic Energy
<b>CIRA</b>	Centro de Investigacion en Recursos Acuaticos - Centre for Evaluation in Water Resources (Nicaragua)
<b>CLCuV</b>	Cotton leaf curl virus
<b>CNEN</b>	Comissão Nacional de Energia Nuclear - National Nuclear Energy Commission (Brazil)
<b>CNR</b>	Centro Nacional de Radioterapia - National Radiotherapy Centre (Nicaragua)
<b>CPF</b>	Country Programme Framework
<b>CT</b>	Computer tomography
<b>DNA</b>	Deoxyribonucleic acid
<b>EB</b>	Electron beam

<b>EEC</b>	European Economic Commission
<b>EEPCO</b>	Ethiopian Electric Power Corporation
<b>EGWRAP</b>	Ethiopian Groundwater Resource Assessment Programme
<b>ELISA</b>	Enzyme-linked immunosorbent assay
<b>EMS</b>	Environmental monitoring system
<b>ESCAP</b>	Economic and Social Commission for Asia and the Pacific (UN)
<b>ESTC</b>	Ethiopian Science and Technology Commission
<b>ESTRO</b>	European Society for Therapeutic Radiology and Oncology
<b>EU</b>	European Union
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FITCA</b>	Farming in tsetse controlled areas
<b>FMD</b>	Foot and mouth disease
<b>GC</b>	General Conference
<b>GEF</b>	Global Environmental Facility
<b>GHG</b>	Greenhouse gas
<b>GSE</b>	Geological Survey of Ethiopia
<b>IAEA</b>	International Atomic Energy Agency
<b>IBAR</b>	Inter-African Bureau for Animal Resources
<b>ICRAF</b>	International Centre for Research in Agroforestry
<b>ICT</b>	Information and communication technology
<b>IMO</b>	International Maritime Organization
<b>ININ</b>	Instituto Nacional de Investigaciones Nucleares - National Nuclear Research Institute (Mexico)
<b>INIS</b>	International Nuclear Information System
<b>IRMA</b>	Immunoradiometric assay
<b>ISL</b>	In situ leaching
<b>ISOE</b>	International Society of Occupational Exposure
<b>ISRO</b>	International Society for Radiation Oncology
<b>IVIC</b>	Instituto Venezolano de Investigaciones Cientificas - Venezuelan Institute of Scientific Research
<b>IWTT</b>	Interwell tracer test
<b>JI</b>	Joint implementation
<b>KACST</b>	King Abdulaziz City for Science and Technology (Saudi Arabia)
<b>KANUPP</b>	Karachi Nuclear Power Plant (Pakistan)
<b>LDC</b>	Least developed country
<b>LIDIVET</b>	Laboratorio de Investigaciones y Diagnosticos Veterinarios - National Diagnostic and Service Laboratory for Animal Diseases (Bolivia)
<b>MTBF</b>	Department of Management, Division of Budget and Finance
<b>NDT</b>	Non-destructive testing
<b>NLO</b>	National Liaison Officer

<b>NPIC</b>	Nuclear Power Institute of China
<b>NPP</b>	Nuclear power plant
<b>NRC</b>	Nuclear Research Centre
<b>OAU</b>	Organization of African Unity
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>OIE</b>	Organisation Internationale des Epizooties
<b>OPEC</b>	Organization of the Petroleum Exporting Countries
<b>OWS</b>	Old world screwworm
<b>PARC</b>	Pan African Rinderpest Campaign
<b>PATTEC</b>	Pan African Tsetse and Trypanosomosis Eradication Campaign
<b>PCR</b>	Polymerase chain reaction
<b>PGNAA</b>	Prompt gamma neutron activation analysis
<b>PIP</b>	Portable imaging processing
<b>PNRI</b>	Philippine Nuclear Research Institute
<b>PSA</b>	Probabilistic safety analysis
<b>PSAR</b>	Preliminary Safety Analysis Report
<b>QA</b>	Quality assurance
<b>QC</b>	Quality control
<b>QNNP</b>	Qinshan Nuclear Power Plant (China)
<b>RAIS</b>	Regulatory Authority Information System
<b>RBA</b>	Receptor-binding assay
<b>RBMK</b>	High-power channel-type reactor (Russian design)
<b>RCA</b>	Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (for East Asia and the Pacific)
<b>RIA</b>	Radioimmunoassay
<b>RRC</b>	Regional Resource Centre (other terms used in different regions to refer to the same concept include "Centres of Excellence", "Designated Regional Centres [DRC]" and "Regional Resource Units [RRU]").
<b>RT-PCR</b>	Reverse transcription and polymerase chain reaction
<b>RTD</b>	Residence time distribution
<b>SAARC</b>	South Asian Association for Regional Co-operation
<b>SAR</b>	Safety Analysis Report
<b>SAT</b>	Systematic approach to training
<b>SIT</b>	Sterile insect technique
<b>SPECT</b>	Single photon emission computed tomography
<b>TAEA</b>	Turkish Atomic Energy Authority
<b>TC</b>	Department of Technical Co-operation (IAEA)
<b>TCDC</b>	Technical Co-operation among Developing Countries
<b>TC-PRIDE</b>	TC Project Information Dissemination Environment (software)

<b>TCF</b>	Technical Co-operation Fund (IAEA)
<b>TLD</b>	Thermoluminescent dosimetry
<b>TSH</b>	Thyroid-stimulating hormone
<b>TSP</b>	Triple super phosphate
<b>UMMB</b>	Urea molasses multinutrient blocks
<b>UNAIDS</b>	Joint United Nations Programme on HIV/AIDS
<b>UNAN</b>	Universidad Nacional Autónoma de Nicaragua - National Autonomous University of Nicaragua
<b>UNDAF</b>	United Nations Development Assistance Framework
<b>UNDP</b>	United Nations Development Programme
<b>UNOPS</b>	United Nations Office for Project Services
<b>USAID</b>	United States Agency for International Development
<b>WENRA</b>	Western European Nuclear Regulators' Association
<b>WHO</b>	World Health Organization
<b>WWER</b>	Water-cooled and water-moderated reactor (Russian version of PWR)
<b>XRF</b>	X-ray fluorescence

## GLOSSARY

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**Adjusted programme** - the total value of all technical co-operation activities approved and funded for a given calendar year plus all approved assistance brought forward from previous years but not yet implemented. It is against this figure - which is not identical with resources actually available - that the implementation rate is measured.

**Assessed programme costs** - the cost charged to Member States receiving technical assistance, at present amounting to 8% of the assistance actually provided from both the TCF and extrabudgetary contributions (but excluding UNDP-financed assistance).

**Available financial resources** - total funds available less disbursements.

**Country Programme Framework** - a descriptive planning process that provides a concise frame of reference for future technical co-operation with Member States.

**Disbursements** - actual cash outlays for goods provided and services rendered.

**Due account** - the regime by which the Agency accords preference in terms of TCF allocations and procurement to those Member States with a good record of financial support to the TC programme. The objective is to increase the level of contributions to the TCF and to improve the record of payment of assessed programme costs.

**Dynamic programming** - the process whereby funds released through rephasing and reprogramming are used to meet requirements of developing Member States through the implementation of approved projects for which funds would not otherwise be available; it serves to keep project planning realistic.

**Earmarkings** - amounts allotted for funding-approved assistance awaiting implementation.

**Extrabudgetary funds** - funds provided by Member States for financing specific projects or activities. They also include funds received from Member States to finance assistance for themselves. These funds are separate from voluntary contributions to the Technical Co-operation Fund (TCF).

**Footnote-a/ projects** - projects approved by the Board for which no immediate funds are available.

**Global**- under the area breakdown in the implementation summary, this represents those miscellaneous costs which cannot be attributed to individual projects or for which detailed accounting would add significantly to overhead costs. Such expenses include cost of radiation protection services, insurance premiums, UNDP field office charges, reimbursement of support services, mission cancellation costs, publication charges, etc.

**Government cost sharing** - funds provided by Member States to augment projects in their own country.

**Implementation** - the volume of funds obligated (new obligations) in a given period.

**Implementation rate** - a ratio obtained by dividing implementation by the adjusted programme (expressed as a percentage), reflecting the financial rate of implementation.

**In-kind** - the value assigned to non-cash contributions.

**Model Projects** - projects responding to a real need with significant economic or social impact for the end user. These projects feature a competitive nuclear technique and require a local environment conducive to project success and sustainability.

**New obligations** - the sum of disbursements during the year plus year-end unliquidated obligations minus unliquidated obligations carried over from the previous year.

**New resources** - the total value of not previously reported funds received in a calendar year.

**Overprogramming** - the establishment of annual programming levels which exceed available resources.

**Programme year** - the year for which an activity is planned and budgeted.

**Programme commitments** - total unliquidated obligations for the current year plus earmarkings.

**Programme Reserve** - an amount set aside by the Board each year for financing assistance of an urgent nature requested after the Board has approved the Technical Co-operation Programme for the year in question.

**Rate of attainment** - a percentage arrived at by taking the total voluntary contributions paid by Member States for a particular year and dividing them by the TCF target for the same year. As payments can be made after the year in question, the rate of attainment can increase over time.

**Rephasing** - a temporary release of funds approved for inputs which were planned for a given programme year and which cannot be implemented as scheduled. Rephasing does not change total inputs approved for a project; rather, it serves to keep project planning realistic.

**Technical Co-operation Fund** - at present, the main fund for the financing of the Agency's technical co-operation activities; it is supported by voluntary contributions from Member States, 8% assessed programme costs paid by Member States over assistance received, and miscellaneous income.

**Thematic Plan** - a prescriptive planning process that focuses on the technology-problem link where TC projects have successfully demonstrated a significant contribution to national socio-economic development, or where solid evidence exists to predict such a contribution.

**Type II fellowship** - fellowships provided by Member States at little or no cost to the Agency.

**Usable unobligated balance** - the unobligated balance of the TCF less the sum of pledges not yet paid and the dollar equivalent of currencies which can only be used with great difficulty. The purpose is to measure the amount of money which is readily available for TC programme obligations.

**Underprogramming** - the condition arising when the total annual programming level is less than the available resources. This situation occurs when large unexpected resources are made available very late in the year or when significant amounts of programme are removed without replacing them with other activities.

**UNDP Programme** - projects executed or implemented by the Agency on behalf of UNDP and its associated funds.

**Unliquidated obligations** - obligations incurred for which no cash outlays have yet been made.