

# **TECHNICAL CO-OPERATION REPORT FOR 2001**

**REPORT BY THE DIRECTOR GENERAL**

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**INTERNATIONAL ATOMIC ENERGY AGENCY**



# CONTENTS

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<b>Foreword</b> .....	<b>i</b>
<b>PART I: STRENGTHENING TECHNICAL CO-OPERATION</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>1</b>
1. Upstream Work for the 2003-2004 Technical Co-operation Programme .....	1
2. Partnership Building.....	2
3. Self-reliance of Institutions using Nuclear Techniques and Sustainability of Outcomes .....	4
4. Financial Aspects of the Technical Co-operation Programme in 2001 .....	7
5. Streamlining Procedures .....	7
6. Making the Technical Co-operation Programme Better Known .....	8
7. Constraints and Shortcomings.....	9
<b>PART II: TECHNICAL CO-OPERATION MAJOR ACHIEVEMENTS</b> .....	<b>11</b>
1. Africa .....	11
2. East Asia and the Pacific .....	16
3. Europe .....	22
4. Latin America.....	26
5. West Asia .....	31
6. Highlights of Completed Projects for 2001.....	35
<b>PART III: RESOURCES AND DELIVERY</b> .....	<b>40</b>
1. Overview.....	40
2. Technical Co-operation Fund .....	43
3. Extrabudgetary Contributions .....	48
4. In-kind Contributions.....	48
5. Global Indicators.....	49
<b>ABBREVIATIONS and ACRONYMS</b> .....	<b>57</b>
<b>GLOSSARY</b> .....	<b>62</b>



## Foreword

Using nuclear technology as an effective tool for development is the challenge faced by the Agency's technical co-operation programme. This was the subject of the 4<sup>th</sup> IAEA Scientific Forum, entitled "Nuclear technology for sustainable development: serving human needs," which was held in conjunction with the 45<sup>th</sup> General Conference in September 2001. Opening the Forum, Professor Jeffrey Sachs of Harvard University emphasized the importance of developing mechanisms to mobilize science and technology to meet the growing challenge of serving human needs in a sustainable manner and commended the Agency for its achievements in this regard. This report provides information on how the technical co-operation programme has responded to that challenge over the past year.

One of the highlights of the technical co-operation programme in 2001 was the launching of the Pan-African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) in Ouagadougou, Burkina Faso, in October. This represented the culmination of years of effort by African Member States, working in partnership with the Agency and the Organization for African Unity (OAU), and was an important milestone in the progress of applying the sterile insect technique (SIT) to the area-wide eradication of the tsetse fly in Africa. It is a good example of how science and technology can contribute to socio-economic development with a direct impact at the community level.

The level of Member States' pledges to the Technical Co-operation Fund (TCF) for 2001, more than \$59 million, was the second highest ever. This represented a rate of attainment<sup>1</sup> of 80.01% (as of 31 March 2002), thus achieving the target set by the General Conference for that year. The extrabudgetary contributions, more than \$7 million, were the highest in ten years. These contributions, together with payments of assessed programme costs and other income, meant that total new resources for the year reached \$71.1 million.

In December 2000, the Board approved an exceptional measure to strengthen the personnel resources for the management of technical co-operation. It agreed to the allocation of up to \$1 million from the TCF to hire additional staff for programming and implementation, in order to alleviate the serious shortage of human resources in the Department of Technical Co-operation. The Board followed up this decision in June 2001 by recommending an increase in the budget for Major Programme 6, Management of Technical Co-operation for Development, to continue to finance the additional personnel, and the General Conference approved the increase in September. Evidence that the Agency made good use of the additional human resources in the Department of Technical Co-operation can be seen in the record levels of programme delivery for the year. New obligations amounted to \$71 million, an increase of \$5 million, or 7.6%, over 2000.

Recent events have brought the Agency and its mission more attention from a broader section of the public and increased their understanding of the Agency's role in protecting against nuclear terrorism. Activities of the technical co-operation programme that contribute to meeting this objective include the Agency's support to Member States in building up their radiation protection infrastructure, where the main emphasis is on regulatory control of radioactive sources. Measures to protect the population from accidental exposure to radiation also serve to reduce the risks of intentional misuse of such material. The technical co-operation programme is used as an important vehicle for the provision of training and expert advice in the fields of physical protection of nuclear material, nuclear installation safety, and prevention of illicit trafficking in nuclear materials, among others. These activities

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<sup>1</sup> The "rate of attainment" was established by General Conference resolution GC(44)/RES/8 as a measure of the payments by Member States to the TCF in relation to the target set by the General Conference each year. In that resolution, minimum rates of attainment were set at 80% for 2001, 85% for 2002, and 90% for 2003.

can be expanded if Member States request it; however, such support will not be undertaken at the expense of the technical co-operation programme to promote socio-economic development.

In line with the request of the General Conference in resolution GC(45)/RES/11, the Secretariat has worked with Member States during the past year to update the Technical Co-operation Strategy<sup>2</sup>, endorsed by the Board in 1997. Through implementation of the Strategy, the Agency has been successful in raising the quality of technical co-operation projects and increasing the impact of the programme on the development goals of its Member States. The Third Standing Advisory Group on Technical Assistance and Co-operation (SAGTAC III), which met in August 2001 and March 2002, examined the Strategy and advised the Director General on future objectives and the performance indicators with which to measure progress towards these objectives.

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<sup>2</sup> See "Technical Co-operation Strategy" (GOV/INF/824, 24 October 1997) and "Technical Co-operation Strategy: A Progress Report" (GOV/INF/2000/24, 10 November 2000).

# PART I: STRENGTHENING TECHNICAL CO-OPERATION

## Introduction

1. General Conference resolution GC(45)/RES/11 requested the Director General to pursue, in consultation with Member States, efforts to strengthen the technical co-operation activities of the Agency through the development of effective programmes aimed at promoting and implementing the scientific, technological and regulatory capabilities of developing countries. The resolution further requested the Director General to report to the Board periodically and to the General Conference at its 46th session on the implementation of this resolution. Part I of this report responds to that resolution. Parts II and III of this report cover the calendar year 2001, while this part covers the period since the last report to the General Conference, 1 April 2001 to 31 March 2002.

### 1. *Upstream Work for the 2003-2004 Technical Co-operation Programme*

2. As the quality of the technical co-operation programme begins with the quality of its preparation, careful upstream work constitutes the foundation upon which the programme is built. Therefore the Secretariat devoted considerable effort in 2001 to supporting countries in choosing and preparing their requests for technical co-operation projects, emphasizing to national authorities that the primary consideration for project selection would be project quality and potential for impact.

3. In order to increase the quality and relevance of the technical co-operation programme for the coming biennium, the Secretariat set the requirement that a majority of projects in the 2003-2004 programme should meet the central criterion<sup>3</sup>. Adherence to the central criterion is reflected among the performance indicators for the management of technical co-operation in the Agency's Programme and Budget 2002-2003 (GC(45)/8).

4. The central criterion supersedes the Model Project concept, which, as an instrument used in the first phase of the Technical Co-operation Strategy, has been successful in raising the quality of technical co-operation project design. The aim of the central criterion is to support governments in setting their technical co-operation priorities. Attaining the desired outcomes requires shared responsibility and accountability on the part of governments. Compliance with the central criterion will ensure that a government will only request a project if the government is committed to the project's success.

5. The results of a preliminary analysis of the project *requests* submitted for the 2003-2004 technical co-operation programme show that nearly 70% of the requests from all regions fulfil the central criterion (West Asia 55%, Africa 69%, Europe 72%, and Latin America and East Asia and the Pacific each 82%). Furthermore, the number of requests has been reduced, which shows that countries are succeeding in prioritizing their requests as a result of effective upstream work.

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<sup>3</sup> A project meets the central criterion if it addresses an area of real need in which there is a national programme enjoying strong government commitment and support. Such projects take two forms: (a) those that produce a tangible socio-economic benefit in an area in which nuclear technology holds a comparative advantage; and (b) those that clearly support an enabling environment for the use of nuclear technologies (such as safety infrastructures or energy planning).

6. The Secretariat and Member States co-operated in providing training for counterparts to improve the quality of project requests and ensure that they are in accordance with government policies and national development priorities. Training workshops were organized according to the specific needs of the counterparts in each of the regions to enhance mutual understanding of the requirements for the selection, design, and formulation of good quality project requests in line with the Technical Co-operation Strategy. In the Latin America region, for example, the Agency conducted national and regional training courses for counterparts in the Logical Framework methodology.<sup>4</sup> In Europe, training in project design was conducted for the first time in Russian for all the countries in the region where Russian is the main technical language.

7. New opportunities for the technical co-operation programme in the coming years were identified through two new Thematic Plans prepared in 2001, one on the application of SIT for area-wide eradication of the tsetse fly and one on Coastal Zone Management (CZM). The plan on SIT builds on many years of Agency experience in this field, while the one on CZM expands on a relatively new area of activity for the Agency. The development of the CZM Thematic Plan was carried out in co-operation with the Agency's Marine Environment Laboratory in Monaco and also included inputs from the Agency's laboratories in Seibersdorf. Coastal zones represent an area of great economic importance for many developing countries because of their importance for fisheries, both for export income and to provide food, and for agricultural and industrial development. The Thematic Plan identified several areas related to the management of coastal zones where there is a comparative advantage in the use of nuclear techniques over conventional methods. The CZM planning process has already resulted in a regional Africa project planning workshop, a national project planning workshop in Chile, an interregional project on harmful algal blooms (HABs), and technical collaboration with the US National Atmospheric and Oceanic Administration on assays for marine neurotoxins.

## **2. Partnership Building**

8. In resolution GC(45)/RES/11, 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 nongovernmental bodies to ensure co-ordination and optimization of complementary activities.

9. Identifying the right financial, technical, and strategic partners is important to the success of the technical co-operation programme. At the national and regional levels, this means developing closer relations with the mainstream development ministries, through which the Agency can connect with the beneficiaries of technologies. An example is the Ministry of Environment of Niger, which in 2001 established a high-level Technical Co-ordination Committee within the Ministry to tackle the issues of desertification, citing the Agency's regional project on combating desertification in the Sahel. Through this Committee and the Ministry's support, the Agency is able to work with the decision-makers who can ensure the project's impact and sustainability.

10. It is particularly important to create partnerships that are "upstream" and "downstream" from Agency projects. Nuclear techniques are frequently most useful in solving specific problems that are part of a larger set of problems; they represent only one link in a chain, but often a key link. The Agency's mandated role is to concentrate on those areas that involve the application of nuclear techniques. However for such projects to

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<sup>4</sup> The logical framework, or logframe, is a tool that is widely used by bilateral donors and multilateral organizations to design technical co-operation projects. It provides a standardized approach that facilitates adherence to established guidelines.



provide sustainable long-term benefits to the target beneficiaries and thus create a greater development impact, it is necessary to solve the larger set of problems.

11. In 2001, the Agency strengthened its partnership with the Musculo-skeletal Transplant Foundation (MTF) and negotiated a Memorandum of Understanding to be signed in 2002 for co-operation in the field of tissue banking. In order for the tissue banks to be beneficial for the population, upstream efforts are required to raise public awareness and encourage people to register as donors, and downstream training is needed for surgeons and technical personnel in hospitals to make proper use of tissue for transplants. The partnership with MTF provides both upstream and downstream links, supporting both public awareness campaigns and training in surgical techniques at leading hospitals.

12. The Agency has also developed a partnership with the University of Singapore to establish an international centre for training tissue bank operators, based on the previous co-operation with the University to develop a curriculum and training material. The material is now being further elaborated into an electronic learning ("e-learning") programme, which will make it possible to expand the number of trainees and decrease the cost by eliminating the need to travel to Singapore to follow the course of study. This reflects a unique approach to programming whereby the technical responsibility for the programme is increasingly borne by Member State institutions, with support from the non-governmental organization (NGO) community and private sector, while the Agency's role shifts from one of being the main project implementer to a standard setting and advisory one. This also creates what is becoming known as an exit strategy, which permits the Agency to move forward toward new technical challenges.

13. Collaboration at the project level forms part of a longer term strategy to build partnerships at the programme level with major funding organizations that support development objectives in Member States. In the latter part of 2001, the Agency began negotiations to formulate a framework agreement with the Asian Development Bank (ADB). It is expected that an agreement will be reached during 2002 that will enable the two organizations to co-operate in reducing micronutrient malnutrition in Asia, using the Agency's technical expertise and the ADB's field presence in the region, thus increasing impact and avoiding duplication of effort.

14. The Agency continues to develop partnerships to support initiatives at the regional level, that require a concerted transboundary effort, such as water management. The development and management of freshwater resources is one of the most critical environmental and development challenges facing the world today. It represents an area where the Agency's expertise and experience in the application of isotope hydrology clearly give it a comparative advantage, which other partners are beginning to recognize, and where it is necessary to work with the right partners to realize the full benefit of using nuclear techniques. The Agency developed a working partnership on this basis with the World Bank, the Organization of American States, and the Global Environment Facility. This partnership was forged while preparing a comprehensive project for sustainable management of the Guarani Aquifer, which is the largest freshwater aquifer in Latin America and one of the largest groundwater aquifers in the world.

15. A related topic is the development of saline agriculture, helping countries to grow economically useful salt-tolerant plants on wastelands using saline groundwater. Isotopic analysis is used to provide information on groundwater dynamics with respect to quantity and quality and thus sustainability of saline agriculture in a given area. An interregional project covering Africa, East Asia and the Pacific, and West Asia has established demonstration sites for growing a total of more than 30 species of plants in the participating countries. A Memorandum of Understanding was signed in early 2002 with the International Centre for Biosaline Agriculture in Dubai, United Arab Emirates, to support these activities.

16. Two more financial agreements were signed in 2001 with bilateral donors, Norway and the United States Agency for International Development (USAID), to provide support for footnote-a/ projects. Norway is supporting feasibility and pre-project assessments critical to the success of co-operative efforts by Burkina Faso and Mali on SIT applications. These activities are part of a major initiative in West Africa to implement an area-wide eradication campaign for the tsetse fly, as envisaged in the OAU/PATTEC Plan of Action. USAID is supporting the application of SIT to control the Mediterranean fruit fly in the Jordan Valley that is achieving a high level of co-operation in this field between Israel, Jordan, and the Territories under the Jurisdiction of the Palestinian Authority.

### **3. *Self-reliance of Institutions using Nuclear Techniques and Sustainability of Outcomes***

17. In resolution GC(45)/RES/11, the General Conference requested the Director General to promote, within the framework of the technical co-operation programme, activities supporting self-reliance, sustainability and further relevance of national nuclear entities in Member States, particularly in developing countries, including encouraging regional and interregional co-operation on this issue. The General Conference also emphasized the need to understand the market place for nuclear technology and to develop mechanisms and best practices for working with the private and the public sectors.

18. Achieving self-reliance of institutions using nuclear techniques and provision of services to target beneficiaries on a sustainable basis are important long-term goals of the Agency's counterparts. Agency support to Member States in attaining these goals is a key component of the second phase of the Technical Co-operation Strategy. National institutions recognize the importance of understanding the development problems that their countries are facing and how nuclear technologies can be used to solve them. The institutions want assistance in increasing client satisfaction by improving the services they provide in terms of quality, timeliness, cost-effectiveness and responsiveness to the user's needs.

19. The Agency is expanding its traditional role of supporting technical capacity building to one of strengthening the management of nuclear technology for development. Member States are learning to manage nuclear institutions according to modern and innovative management principles in order to make them more self-reliant and able to deliver their services and products in a cost-effective manner to the private and the public sectors. Regional projects to support the self-reliance and sustainability of national nuclear institutions were carried out in 2001 in the Africa, East Asia and the Pacific, and Latin America regions. These projects assist Member States to assess ongoing programmes in terms of relevance to national priorities, cost-effectiveness and quality of managerial practices; to design programmes which are demand-driven and can achieve socio-economic impact; and to prepare strategic plans for nuclear institutions to gain greater self-reliance.

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

20. The General Conference, in resolution GC(45)/RES/11, requested the Director General to continue the Agency's efforts to work with Member States within relevant regional groups in identifying Regional Resources Centres (RRCs)<sup>5</sup> and in developing and refining outsourcing mechanisms in the context of enhancing technical co-operation among developing countries (TCDC). The promotion of TCDC is an outcome of the capacity-building emphasis of the technical co-operation programme, and is consistent with the

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<sup>5</sup> Regional Resource Centre, other terms used in different regions to refer to the same concept include Centres of Excellence, Regional Designated Centres (RDCs) and Regional Resource Units (RRUs).

Agency's growing role, not only as a provider of technology but as a facilitator to help countries obtain services, expertise, and training from each other.

21. TCDC represents an important component of the regional projects to improve the management of nuclear institutions as described above. In the Africa region, for example, the experience gained by South African institutions in rationalizing scientific programmes, streamlining their administrative procedures and improving many areas of management enables them to assist other African institutions in their modernization efforts.

22. Participation in the Model Projects for upgrading radiation protection infrastructure also promoted closer co-operation among the countries involved, especially at the regional level, and enhanced exchange of experience in adopting International Basic Safety Standards (BSS). This has been facilitated through the exchange of experts, fellows and scientific visitors, and especially by attendance at training courses organized under the projects. In the Europe region, the projects served to renew previous contacts, particularly among the countries in the Commonwealth of Independent States (CIS). A number of the training courses for the CIS countries were conducted in Russian, which is widely used by specialists in these countries.

23. The RRC concept was introduced in the late 1990s, and since then the Secretariat has reported annually on the progress made. The experience gained during these first years has shown that what is important is not the number of RRCs, but how they are used and what value they hold for the region. In West Asia there was substantial progress in the identification and designation of RRCs during 2001. A panel of experts from the region, which met in Vienna in June, examined the proposals received from the Member States. Following the circulation of the Panel's recommendations, the Member States in the region reached a consensus on the designation of seven new RRCs in six fields; an additional six centres will be designated as RRCs as soon as all the necessary criteria are fulfilled.

24. In Latin America, progress was made towards adding several Regional Designated Centres (RDCs) to the 25 existing ones, which are recognized by the Member States participating in the Regional Co-operative Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL). The Agency is actively promoting TCDC through the ARCAL projects, which make use of the expertise and services available within the region. Training is provided in the nuclear sector, both within and outside of Agency projects, not only in the context of the formally recognized ARCAL RDCs. A case in point is the training provided for many years by Argentina in radiation protection, both to participants from the region and from outside the region.

25. In Africa, there are six RDCs in radiation oncology, radioactive waste management, mutation breeding and biotechnology, non-destructive testing techniques, and maintenance of nuclear instrumentation and medical equipment. Through these RDCs and Specialized Teams, the use of the TCDC modality has significantly expanded in 2001 to cover many priority needs of the region. About 70% of the region's needs in advisory assistance and lecturing provided under TC projects were covered through expertise available within the region, thus achieving a significant reduction in the cost of programme delivery under AFRA.

26. The East Asia and the Pacific region has experienced both the successes and difficulties that are associated with Regional Resource Units (RRUs). For example: some RRUs are used by other organizations within the country, while others are not; an offer of expertise by an RRU to project teams from other countries may not be accepted, perhaps for reasons of cost. Positive examples include the following: an RRU in Pakistan is analyzing water samples for other Member States and developed a proposal for the 2003-2004 technical co-operation programme on groundwater pollution in urban and industrial areas; personnel from Viet Nam are gaining experience in analysis of air particulate matter samples in an RRU in Singapore; an RRU in New Zealand is analyzing air particulate matter for Bangladesh; and in an RRU in the Philippines two fellows from Pakistan were trained in

receptor binding assay (RBA), enabling them to set up facilities to carry out the RBA in Pakistan.

27. Another highlight was the inauguration of the regional office for the Regional Co-operative Agreement for Research, Development, and Training Related to Nuclear Science and Technology (RCA) on 27 March 2002 within the premises of the Korean Atomic Energy Research Institute (KAERI) in Daejeon, Republic of Korea. The main role of the regional office, which is financed by a contribution from the Government of the Republic of Korea, will be to increase visibility of the RCA technical co-operation activities and the profile of RCA in the region, as well as to seek additional partners for the RCA programme. The office will run for a period of two years before a final decision is made on its future.

### **Strengthening Human Resources**

28. A core area of the technical co-operation programme over the years has always been human resource development, aiming at ensuring the sustained development of nuclear technology in Member States. In the past, an important part of these efforts focused on long-term fellowships to provide advanced education and training in nuclear related fields. Later it was decided to reduce the amount of this kind of training, as it was felt that shorter courses, which did not require such long absences from the fellows' home countries, were better suited to strengthening human resources in developing countries.

29. In recent years, however, greater attention has again been given to the Agency's role in ensuring the continuity of knowledge in the nuclear field, including support to Member States in providing longer-term training in nuclear sciences and technology. Under a new regional project in West Asia, for example, six long-term fellowships, with a duration ranging from one to four years, have been awarded in the fields of medical physics, nuclear physics, nuclear medicine, and radiotherapy. Similar long-term fellowships have been awarded in the health sector of the Africa region.

30. The Agency is also supporting training packages called "sandwich programmes," which combine focused training abroad with education in the home country or within the region of the home country. The institutions involved co-operate to ensure that the training is complementary, and at the end of the programme the fellow may receive a degree from both institutions or from the university in the home country. In 2001, three fellows from the Africa region participated in a sandwich programme in the area of nuclear medicine.

### **Quality Assurance and Quality Control**

31. Quality assurance and quality control (QA/QC) are critical elements for self-reliance and sustainability. To become competitive in the national and international marketplace, developing country institutions must improve the quality of the services they provide, and they must obtain official recognition of this quality. In order to support them in their efforts, the Agency is implementing a number of projects that support QA/QC. These projects draw upon the Secretariat's experience and expertise in promoting quality in diverse fields. QA/QC represents one of the areas of activity that were identified within the Secretariat as requiring co-ordinated approaches and strategies because they cut across more than one Agency programme. Therefore mechanisms for integration and co-ordination are being established in the Secretariat, which will lead to more efficient use of resources and more effective delivery, and will thus benefit the technical co-operation programme.

32. Increasing globalization and stricter trade regimes place new demands on Member States seeking to enter markets, particularly for agricultural products. There is growing recognition that nuclear analytical techniques can play an important role in helping Member States meet purity standards and phytosanitary requirements. Over the past 20 years, the Agency has helped to establish a large number of nuclear analytical laboratories in its Member States. Now it is helping them to introduce and implement QA/QC programmes in these laboratories in order to facilitate national and international commerce. As described in Part II, Agency projects are assisting analytical laboratories in Member States to adopt and apply the International Organization for Standardization (ISO) standards. Achieving these standards will improve the laboratories' performance and facilitate the export of goods throughout the world.

#### **4. Financial Aspects of the Technical Co-operation Programme in 2001**

33. In resolution GC(45)/RES/11, the Director General was requested to continue to take account of the views of the General Conference when requesting Member States to pledge and pay their respective shares of the TCF targets and to make timely payments to the TCF in accordance with resolution GC(44)/RES/8. The General Conference also urged Member States to pay in full and on time their voluntary contributions to the TCF, and reminded recipient Member States of their obligation to pay their assessed programme costs (APCs).

34. 2001 was the first year in which the rate of attainment mechanism, established by GC(44)/RES/8, was applied. As mentioned in the Forward, it measures the payments by Member States to the TCF in relation to the target set by the General Conference each year. The resolution set minimum rates of attainment at 80% for 2001, 85% for 2002, and 90% for 2003. The total pledges to the TCF for 2001 equalled 81% of the \$73 million target, and as of the end of March 2002, payments amounted to 80.01% of the target, thus reaching the minimum rate of attainment. However, it will require a concerted effort by all Member States to meet the rate of attainment targets they have set for 2002 and 2003.

35. The second major component of the TCF comprises the APCs, which are charged to recipient Member States at the rate of 8% of the technical co-operation programme disbursements for the preceding year. Member States are making efforts to pay the approximately \$7 million in arrears of APCs that have accumulated, some of them following payment plans as described in Part III. In 2001, as in 2000, the income from APC payments exceeded the total amount of the assessments.

#### **5. Streamlining Procedures**

36. The General Conference, in resolution GC(45)/RES/11 requested the Director General to continue to further develop and facilitate cost sharing, outsourcing, and other forms of Partnership in Development by reviewing, amending or simplifying, as appropriate, relevant financial and legal procedures in consultation with the Board of Governors and with Member States.

37. Citing the experience of other UN system organizations as background material, the Secretariat had already presented draft revisions of the rules for accepting voluntary contributions, both financial and in-kind, to the Board of Governors in June 2001. These revisions were approved by the General Conference in resolution GC(45)/RES/9. The changes raised the limit on the value of contributions that may be accepted without special approval by the Board from intergovernmental organizations with which the Agency has not concluded a relationship agreement or from non-governmental sources. It is expected that in the coming years this could facilitate co-operation with non-traditional partners.

38. Government cost sharing is a way in which national authorities demonstrate their firm commitment to the success and sustainability of a project in their country or region. In 2001, the governments of several Member States made significant cost-sharing contributions for national projects, bringing the total for the year to more than \$2.6 million, which is higher than it has been in the last ten years. Further information on the projects for which these contributions were made is given in Parts II and III of this report.

39. In the past year, the Agency has taken important steps towards developing an effective outsourcing mechanism, starting in the Latin America region with enhanced TCDC between Mexico and Guatemala. Under this form of TCDC, Mexican partners are providing all of the human resource components of the Agency technical co-operation projects in Guatemala in different fields, including the fielding of experts, the provision of training, and the placement of fellows. This approach has the important additional benefit of promoting further co-operation in science and technology between the two countries. Through this example, the Agency has made progress in the direction of full-fledged outsourcing. It is intended that this experience should serve a model for similar co-operation between other countries, although it is recognized that the possibilities of such co-operation will depend on the particular technical fields involved.

40. A further step towards effective outsourcing can be seen in the hiring of regional contractors by the Agency for radium conditioning. The contractor in each region collects the decayed radium needles used for brachytherapy in hospitals and places them in containers for long-term storage following the procedures established by the Agency. Regional contractors are located in Brazil, Republic of Korea, Pakistan, and South Africa.

41. In November 2000, the Board of Governors asked the Director General to review the rules, regulations, and procedures governing the provision of technical assistance to Member States, with the aim of improving the efficiency and effectiveness of the processes and reducing unnecessary workload for both the Secretariat and Member States. A major area for review, which was examined by the SAGTAC during its meeting in August 2001, is the TC programming and budget approval cycle.

42. The current system is a process with a fixed schedule lasting two years, from project request through formulation and appraisal to final approval. It also requires additional steps to re-approve projects already approved: approximately one-third of the projects in the biennial technical co-operation programme presented to the Board are ones that have been approved before. The current system may have been appropriate when Member States were concerned primarily with inputs and their cost. But results-based management demands that Member States now shift their focus away from inputs and activities to outputs and outcomes, which inherently take longer to achieve. SAGTAC will review the subject again in early 2003 and examine possible alternative approaches. The results of their deliberations and the further review and consultations within the Secretariat will be covered in greater detail in future annual reports.

## **6. Making the Technical Co-operation Programme Better Known**

43. The technical co-operation programme maintains two web sites, TC Web and TC-PRIDE (TC Project Information Dissemination Environment). TC Web (<http://www-tc.iaea.org>) is the site that provides information for the Member States and the general public; its usefulness for Member States was further enhanced during the year by continual updating and by adding more information and links. TC-PRIDE, which provides online access to financial and statistical data on all Agency technical co-operation projects and information about their implementation status, was also updated and enhanced during the year in response to user feedback. Originally developed for use within the Secretariat, TC-PRIDE was released for use by registered users in Member States in September 2000. During 2001 the number of active external users more than doubled.

44. The Agency contributed to developing regional web sites for AFRA, ARCAL and RCA and installed links to them from the TC Web. These web sites facilitate online access to information about the regional programmes, in particular for members of the regional groups.

45. Early in 2002, the Agency launched a media campaign in order to raise the awareness of the general public and decision-makers about the Agency's contribution to development through its SIT programme in Africa. The campaign targeted print and electronic media in Africa, Europe, and North America, and included an in-depth press release, a video package, and interviews with Agency staff appearing in prominent newspapers and television networks. Following the success of the campaign, further public information activities are planned to create greater awareness of how nuclear techniques are helping to solve serious problems in developing countries.

## **7. Constraints and Shortcomings**

46. A major set of constraints faced by the technical co-operation programme during 2001 was caused by the aftermath from the events of September 11<sup>th</sup> in the United States. Difficulties in air travel and transport in the following months led to the cancellation or postponement of meetings and training courses and hindered some participants in attending them. There were delays in the recruitment and fielding of experts, and the fellowship placement process experienced serious difficulties. Transport problems caused temporary interruptions in the delivery of equipment. These disruptions created additional work for the implementation sections, as meetings and courses for which much of the planning and preparations had already been carried out had to be rescheduled and all the work done a second time, new experts had to be recruited and some equipment and supplies had to be ordered again. Further details are given in Part III.

47. Another serious source of constraints to the programme is seen in the payment records of some countries to the TCF. The technical co-operation programme is based on the principle of support by all the Agency's Member States. The TCF targets are adopted by consensus in the form of a General Conference resolution; thus Member States are considered to have entered into a commitment to make voluntary contributions in accordance with their shares of the target. It is therefore disappointing that in 2001, 55 countries, both developed and developing, did not pledge to the TCF at all, a further 11 countries did not pay their pledges and 18 paid only part of their target shares. Furthermore, as noted above, many recipient countries are in arrears in their payment of the APCs.

48. The Secretariat has been instructed by the Board to take "due account" of countries' payments of their APCs and their share of the TCF. This applies to recipient countries in allocating TCF financing to projects and to donor countries in procuring inputs for the technical co-operation programme. While the due account principle rewards those countries that have an excellent payment record, it also reduces the amount of assistance that can be provided to recipient countries that fall into the category of poor payers.

49. The heavy cuts in the UNDP budget in recent years mean that funding for UNDP field offices is no longer fully covered. As the Agency does not have field offices, it depends on UNDP for services such as customs clearance, making local payments, and facilitating entry of experts into the country. It is therefore necessary to provide partial support to these individual offices through a Field Support Cost system established by UNDP. The Secretariat is currently in the process of working with individual offices to establish a basis for charges and to set up payment schedules to ensure continued support in the field.

50. Placement of fellows and scientific visitors continues to be hindered by the excessively long time required for prospective host countries to respond to applications, as well as by their time-consuming and not always transparent approach to the selection of

candidates. The delays interfere with the implementation of activities according to the project workplan and prevent projects from meeting their objectives in a timely manner.

51. The implementation of the Technical Co-operation Strategy has highlighted the importance of forging strong linkages between the recipients of technical co-operation and the actual end-users. During the project design process it is not always immediately obvious which institution is the most appropriate end-user to make optimal use of the assistance provided. It is therefore important for the Agency to help its counterparts to expand beyond their traditional partners, where necessary, and build good working relations with those partners who can best provide services to the target beneficiaries.

52. Public perceptions about nuclear energy continue to constitute a barrier to the technical co-operation programme. The resistance to nuclear power in many countries and on the part of many NGOs is not conducive to tapping the full potential of nuclear technologies for solving development problems. Problems in public acceptance also have an impact on the willingness of donor governments to contribute to the TCF and on the willingness of recipient governments to accept solutions involving nuclear techniques. It will require continued efforts of the Secretariat working with its Member States to overcome preconceived ideas and create awareness of the benefits that non-power applications can bring to developing countries.



## PART II: TECHNICAL CO-OPERATION MAJOR ACHIEVEMENTS

### 1. Africa

53. The Central African Republic became a new member of the Agency in 2001, bringing the total number of Member States in the region to 31.

54. As part of the continued effort of the Agency to sustain dialogue with Member States on strategic planning and priority setting, various activities were undertaken to support Country Programme Framework (CPF) development process in several countries, including Democratic Republic of Congo, Libya, Madagascar, Senegal, and Uganda. Along with having the largest percentage of the TC adjusted programme in 2001, Africa has the highest delivery of all the regions in terms of new obligations (US\$ 18.6 million), which represents an increase of approximately 15% compared to the year 2000.

55. Of particular note during the year is the support of the Agency to the Organisation of African Unity's (OAU's) initiative to carry out and co-ordinate the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC), which was launched in Ouagadougou, Burkina Faso in October 2001. In connection with PATTEC and as part of their efforts to reduce poverty, the Governments of **Mali** and **Burkina Faso**, with assistance from the Agency, have begun an effort to eliminate trypanosomosis from their territories through the creation of tsetse fly-free zones using SIT and other interventions techniques. To reflect and record their commitment, national authorities prepared a Programme Development Document which was signed in October 2001, the same day PATTEC was launched. Burkina Faso will support this bi-national undertaking by supplying the sterile male flies for the eradication programme in the peri-urban area of Bamako, and Mali is allocating funds for personnel, field allowances, and operational expenses. Programme support from the Agency is under *MLI/5/017, Integrated Control of Animal Trypanosomosis Through Creation of a Tsetse Fly Free Zone*, and *RAF/5/051, Sterile Insect Technique for Area-wide Tsetse and Trypanosomosis Management*. The momentum of these projects and previous tsetse control successes has garnered extrabudgetary support, such as that from Norway to conduct molecular genetics training, provide mass rearing equipment, and operate aerial test releases of sterile male flies. Furthermore, several Member States have included the tsetse eradication issue in their Poverty Reduction Strategy Papers (PRSPs) under the Heavily Indebted Poor Countries (HIPC) initiative.

### Water Resources Management

56. The technical co-operation programme in isotope hydrology under *MOR/8/008, Management of Groundwater Resources using Isotopic Hydrology*, has been focused on the application of isotope techniques to investigate groundwater hydrology in two regions of **Morocco** (Tadla Plain and Moulouya) and the development of advanced analytical capabilities at the National Centre for Nuclear Energy, Science and Technology (CNESTEN). The isotope results provided a better understanding and quantifiable estimates of the hydraulic conditions of the groundwater system in the Tadla Plain, which enabled the revision of the existing model of groundwater flow and transport, and improved the calibration of the model.

57. Major progress has been achieved within Southern and Eastern Africa under the framework of *RAF/8/029, Sustainable Development of Groundwater Resources*. The project has succeeded in developing local capabilities and making tangible impact in the participating countries (**Kenya, Madagascar, Namibia, South Africa, Tanzania, Uganda**,

**and Zimbabwe).** Some of the key achievements include the following: (a) operation of a modern analytical facility at the University of Witwatersrand, Schonland Research Centre (SRC), South Africa, which is on its way to becoming a self-supporting analytical centre serving Southern Africa, (b) collection of new information which has been incorporated by local authorities into groundwater protection plans in Tanzania, and (c) greater awareness of isotope hydrology techniques amongst national authorities, in some cases leading to incorporating isotope analyses as part of their hydrogeological investigations, such as in Namibia, as well as within major international development projects, such as the watershed assessment project by the World Bank in Tanzania.

58. Agency assistance under *RAF/8/029, Sustainable Development of Groundwater Resources*, has provided the Government of **Madagascar** with information it needs to move ahead with a national programme in the coming biennium. The national project will be funded through bilateral co-operation between the Government and the Japan International Co-operation Agency.

## Human Health

59. The human health programme in Africa not only focuses on the use of radiation and isotopes to prevent, diagnose, and treat disease, but it also assists counterparts with medical equipment maintenance and networking using the latest information and communication technologies.

60. Building on the achievements attained under a large-scale AFRA project on clinical radiation oncology, AFRA Member States designed and formulated another programme in 2001 to address the management of the most common cancers in Africa including human immunodeficiency virus (HIV) related cancers. The new programme is technically backstopped by a programme in nuclear medicine to help confirm the presence of cancers and to assess the performance of treatment. A training programme in both disciplines is included with financial support from cancer organizations such as the European Society for Therapeutic Radiology and Oncology (ESTRO), the International Society for Radiation Oncology (ISRO), and the Joint United Nations Programme on HIV/AIDS (UNAIDS).

61. *SAF/6/004, National Newborn Screening Programme to Identify Metabolism Errors Associated with Mental Retardation*, is reaching more and more babies in **South Africa**. More than 30,000 babies were screened in 2001 at Johannesburg Hospital, and through linkages with private screening centres, another 20,000 babies were screened. The screening programme relies on the use of radioimmunoassay techniques for detection of congenital hypothyroidism and the use of stable isotope-labelled reagents to detect inborn errors of metabolism by tandem mass spectrometry. To maintain the quality of the screening programme, the counterpart is part of a United Kingdom quality assurance scheme and the Center for Disease Control (USA) proficiency testing programme. To aid in the sustainability of the screening, Agency experts promoted the cost-effectiveness of screening to the paediatricians and laboratory staff. A similar programme was initiated in northern South Africa to screen for iodine deficiencies.

62. The Government of **Senegal** launched a community nutrition project (CNP) to protect the most vulnerable groups of the population (women and children) in the poor urban areas of Senegal. Working with the Agency, *SEN/7/003* used isotopes to evaluate the effectiveness of the CNP, supported by the World Bank, the World Food Programme, and the German Kreditanstalt fuer Wiederaufbau (KfW). The study has shown that the supplemented food has significantly influenced the quality of the breast milk (increased concentration of lactose, protein, and zinc were found). As a result, the growth rate of babies at three months was significantly above normal. The results also suggest probable improved levels of fat-soluble vitamins, particularly vitamin A. These study findings have been

presented to the National Commission for Combating Malnutrition and have been used to refine the forthcoming Senegalese Nutrition Programme. This is a major initiative planned for ten years and based on the impact of the CNP.

### **Savings Realized and Self-reliance Strengthened through Tele-maintenance**

Significant savings estimated at \$50,000 thus far and strengthening of self-reliance have resulted from tele-maintenance of gamma cameras by exchanging images and using tele-consultations. This approach was initiated in July 2001 as part of *RAF/4/014*, Maintenance of Medical and Scientific Instruments (AFRA IV-3). Each nuclear institution in the ten Member States participating in the project exchanges weekly quality control images with each other to troubleshoot problems with the equipment. The gamma camera tele-maintenance group is expanding to Asia and Latin America. The World Health Organisation (WHO) has also been co-operating with the tele-maintenance group to make an even greater impact. **Tanzania** (*URT/4/004*) and **Namibia** (*NAM/6/005*) are also finding similar benefits to tele-linking between specialized institutions, including hospitals.

## **Food and Agriculture**

63. Almost 35% of the total technical co-operation programme for Africa is spent on food and agriculture assistance. Nuclear techniques and related biotechnologies are used with conventional methods to increase agricultural output and productivity.

64. The Agency assisted the Institut Polytechnique Rural de Formation et de Recherche Appliquée (IPR-IFRA) in Katibougou, **Mali**, to establish the first plant tissue culture laboratory in the country for breeding research and production of disease-free planting material. Under *RAF/5/042*, *Development of Improved Crop Varieties (AFRA III-1)*, the staff was trained in plant tissue culture techniques and greenhouses were provided for acclimatization of *in vitro* derived plants. In 2001, the facility was improved and enlarged by support of the Malian Government and a French non-governmental organization. The aim is to produce a major part of Mali's imported potato seed material locally at a lower price and thus create income for the laboratory to sustain its operation for plant production and breeding research.

65. In **Zambia**, induced mutation breeding has not only improved varieties of potatoes, but also has provided income for the National Institute for Scientific and Industrial Research (NISIR). The NISIR receives very limited funding from the Government, and thus the additional income it has received from the Zambia Seed Company, Ltd., sustains the daily operation and research and development activities. Results from *ZAM/5/014* led to savings for the end users as well. More than \$130,000 was saved because local production of minituber seeds was cheaper than importing the seeds. The facility also assists another TC project, *ZAM/5/022*, where the objective is to develop mutant varieties resistant to diseases. Furthermore, the laboratory has been used to train students of the University of Zambia and Copperbelt University.

66. In **Tanzania**, Zanzibar's project on livestock development after tsetse eradication is beginning to deliver gratifying results through *URT/5/021*, *Livestock Development in Zanzibar after Tsetse Eradication*. Nuclear techniques are being used in artificial insemination, livestock disease control, and feed supplementation. Since tsetse eradication in 1996, tests show that cattle are no longer subject to trypanosomiasis. This has led to an improvement in the milk output of indigenous cattle, and through artificial insemination, larger and superior cross-bred animals are thriving on the island as demonstrated by the doubling of local beef production. This in turn will have a positive effect on agriculture in that the number of

farmers who fertilize crops with manure has multiplied fivefold. The work of the Agency and the counterpart, as well as an extrabudgetary contribution from OPEC Fund, has created a new environment conducive to livestock development.

### Regionally Produced Kits to Help in the Eradication of Rinderpest

In its contribution to the global efforts to prevent and to fight the spread of rinderpest from the recognized remaining pockets of infection in Africa (*RAF/5/043, Assistance to Complete Eradication of Rinderpest from Africa*), the Agency was very active through collaboration with the United States Agency for International Development (USAID), the International Laboratory for Molecular Biology for Tropical Disease Agents (ILMB), University of California, Davis and the Organisation of African Unity's Pan-African Bureau of Animal Resources (OAU/IBAR) in promoting on the continent the production and distribution of an inexpensive indirect enzyme-linked immunosorbent assay (ELISA) kit through effective technology transfer by ILMB. As part of this initiative, a regional workshop was organized in November 2001 by the Agency at the National Laboratory of Livestock and Veterinary Research (Institut Sénégalais de Recherches Agricoles, ISRA) in Dakar, **Senegal**. The goal of the workshop was to assess the progress achieved with regard to the production technology and to plan for the field validation of the kit with the ultimate goal of certification by the Office International des Epizooties (OIE). The special significance of the kit lies in its potential for the development of appropriate tools for the detection of antibodies to rinderpest, whether induced by vaccination or field infection. This is essential for epidemiological studies and to prevent the spread of rinderpest while allowing the sale and export of vaccinated animals to disease-free regions. Following the field validation of the indirect ELISA kit assigned to three advanced laboratories in Africa (**Côte d'Ivoire, Kenya, and Mali**), the counterparts in Senegal, along with other African veterinary laboratories, will be in a position to produce and distribute these kits to other African Member States.

67. Technical co-operation among developing countries (TCDC) was a key feature of *RAF/5/045, Biofertilizers for Increasing Crop Production and Soil Fertility by Small Holders*, during 2001. Extensive collaboration between the countries involved (**Kenya, Senegal, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe**) took place, including exchange of cultures, seeds, and information on biofertilizer production, inoculation methods, and demonstration/validation trials. Senegal provided training to microbiologists from the other participating countries, and Zimbabwe provided training in biofertilizer production and hosted farm demonstrations.

### Radiation Protection

68. Since the inception of the Model Projects on upgrading radiation protection infrastructure (*RAF/9/027 and RAF/9/029*), significant progress has been achieved by participating Member States in Africa. During the year 2001, **Gabon, Senegal, and Sierra Leone** promulgated legislation, and **Niger** enacted radiation protection regulations. In the case of **Nigeria**, a regulatory authority was established, paving the way for commissioning a nuclear research reactor in 2002. By upgrading the individual monitoring of occupationally exposed personnel, both **Kenya and Tanzania** attained Milestone 2.<sup>6</sup> In the health sector,

<sup>6</sup> Milestone 1: The establishment of a regulatory framework.

Milestone 2: The establishment of occupational exposure control.

Milestone 3: The establishment of medical exposure control.

Milestone 4: The establishment of public exposure control.

Milestone 5: The establishment of emergency preparedness and response capabilities.

See also: GOV/2001/48.

Tanzania also implemented a QA/QC programme for medical exposure control. Also in 2001, national authorities in **Sudan** and Tanzania decided on the establishment of centralized repositories for radioactive waste.

69. The first African Workshop on the Establishment of a Legal Framework Governing Radiation Protection, the Safety of Radiation Sources and the Safe Management of Radioactive Waste was held in April 2001 in Addis Ababa, **Ethiopia**, under *RAF/0/015, Legislative Assistance for the Safe and Peaceful Uses of Nuclear Energy*. The workshop was attended by 29 participants from **Angola, Egypt, Ghana, Kenya, Libya, Mauritius, Namibia, Nigeria, Sudan, Uganda, Tanzania, and Zambia**.

70. Through *RAF/9/028, Post-graduate Training in Radiation and Waste Safety*, a third university-based course was held (in English) in **South Africa**. Fifteen students attended the course from **Angola, Ethiopia, Ghana, Kenya, Libya, Niger, Senegal, Tanzania, and Uganda**. Also during 2001, necessary steps were taken to provide a similar 20-week course for French-speaking students from African countries in 2002 at the newly established Maamoura Centre in Rabat, **Morocco**.

## **Power Planning and Industrial Applications**

71. In the context of sustainable development, improved management of the energy sector is a key factor to support macro-economic growth and productivity. Through the implementation of *RAF/0/016, Sustainable Energy Development in Sub-Saharan Africa*, the Agency assisted participant countries enhance their capacity for long-term strategic planning of energy systems. Some of the tangible outcomes achieved include the holding of the first co-ordination meeting (Accra, **Ghana**, March 2001), where the country presentations and discussions on project implementation clearly showed the importance of building capacity in energy planning. This was further strengthened through the fielding of expert missions to all 14 participating countries.

72. With the completion of *SUD/0/008, Energy Economic and Power Planning*, the first study in **Sudan** by national experts was conducted (previous studies were not comprehensive and done mostly by foreign consultants). The project improved national capabilities for long-term strategic planning of the energy system by transferring proven methodologies for analyzing energy options, training a national team of experts in the use of these methodologies, and assisting in the conduct of a national energy planning study. The capacity-building element was emphasized by organizing, at the request of Sudan, an additional national training course on the use of the IAEA-supported Energy and Power Evaluation Program (ENPEP) in December 2001, attended by 15 national experts.

73. Turning to industrial applications, the Agency assisted in the establishment and strengthening of capabilities in non-destructive testing (NDT) in **Cameroon** under *CMR/8/004, Quality Control and Inspection of Oil Pipeline by NDT*. Specifically, the Agency worked with a local company, Hydrocarbon Company (HYDRAC), in designing the NDT laboratory as well as training at Levels I and II in testing techniques so that HYDRAC could compete for a large share of the advanced testing needed during the construction of the 1070-km Chad-Cameroon oil pipeline. As a result of the training and assistance (including equipment) provided by the Agency, HYDRAC won the bid together with its joint venture partner, Anglo-Américaine (SOLUS O'NEIL), to provide quality control and inspection of the Chad-Cameroon pipeline. HYDRAC is also carrying out NDT services in the petroleum and refinery industry.

## Human Resources Development

74. Recognizing that human resources development is the key factor for ensuring the sustained development of nuclear technology, two regional projects, *RAF/0/011, Human Resource Development and Nuclear Technology Support*, and *RAF/0/012, Institutional support to Least-Developed Countries*, work to upgrade and strengthen the skills and capabilities of human resources for the broad range of nuclear energy applications and to assist Member States in their capacity-building efforts in nuclear science and technology. The approach promoted over the past years is to link training to development needs defined within projects. This has proven to be an efficient way of building institutional capacity in a selective manner and thus ensuring sustainability of Agency-supported activities in areas of major significance in spite of the high staff turnover being experienced in the region. In 2001, there were 401 fellows and scientific visitors in the field, 494 training course participants and 392 meeting/workshop participants under the TC and AFRA Programmes in Africa.

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

75. One of the major themes throughout 2001 in the East Asia and the Pacific region was the focus on self-reliance of institutes and the sustainability of the quality of products from these institutions.

76. As an example of building self-reliance, the Agency worked with national authorities in **Sri Lanka** to create a central laboratory for nuclear research. The lack of such a laboratory was identified as the main constraint to developing nuclear technology and to providing services to end-users. Demonstrating its commitment, the Government approved \$1.3 million to support the Atomic Energy Authority (AEA) in its effort to establish a new laboratory complex for nuclear research. Recognizing the national priority, the Agency assisted the AEA to develop the infrastructure for the safe application of nuclear technologies. The new laboratory complex is complete and services are now being offered. As a result of the Agency technology transfer support and Government commitment, the commercial revenue of the AEA has grown nearly 100% over the past ten years. The AEA revenue now represents approximately 35% of the operating budget, including salaries for the AEA staff.

## Industrial Applications

77. Quality assurance and quality control (QA/QC) holds one of the keys to longevity for many nuclear institutes. In the East Asia and the Pacific region, work was done to improve QA/QC procedures and lead the institutes to self-reliance.

78. A project was successfully completed in **Viet Nam** (*VIE/2/005*) for automation and QA/QC in the nuclear research institute. As a direct result, the sample throughput of the analytical laboratory was increased about fivefold. This contributes greatly to its self-reliance, as the institute relies to a large extent on income from providing analytical services.

79. *RAS/2/009, Quality Assurance and Good Manufacturing Practice of Radiopharmaceuticals*, addresses a current issue regarding continued local production and use of radiopharmaceuticals, namely the implementation of internationally accepted QA and good manufacturing practices (GMP) in the eight countries participating in the regional project, namely **Bangladesh, China, Indonesia, Republic of Korea, Malaysia, Pakistan, Thailand, and Viet Nam**, which have built up solid capabilities to produce and supply a range of radiopharmaceutical products to meet the local demand. Under this project, a guidebook on GMP of radiopharmaceuticals was prepared by the participants and published.

This will be of use to other regions as well. Several workshops addressed GMP application to important segments of radiopharmaceutical production and QC. As a result of this project, all participating laboratories, as well as the national authorities, have understood and appreciated the need to implement GMP in their programmes. China, Republic of Korea, Indonesia and Malaysia have already built clean room facilities at a considerable cost to comply with GMP. Sustaining the momentum generated by the project will result in production of local products with better assured quality and acceptability. The expertise and competence of the local scientists will be considerably enhanced and will help the institutions to develop even further through generating income. This is the first regional project that has helped the eight participating countries to establish linkages and collaboration in this field.

80. A regional project (*RAS/2/010*) was launched in 2001 to enhance the competitiveness of 12 nuclear analytical laboratories in ten Asian countries. The project aims at enhancing quality awareness, creating a concise system for documentation, and establishing standard operating procedures, procedures for validation of methods, methods of performance surveillance, systems for sample management, regular qualification of personnel, enhanced client liaison, and improved safety standards. One training workshop, the first audit inspection with recommendations for improvement, and the first proficiency test to evaluate participants' analytical performance has been carried out. By now, the average compliance of the laboratories is nearly 50% of the ISO requirements. It is expected that by the end of the project more than one-third of the participants will have obtained a level justifying national or international accreditation.

81. A number of countries participating in *RAS/8/082, Isotopic and Related Techniques to Assess Air Pollution - Joint UNDP/RCA (RCA)*, have begun to adopt air quality management legislation, regulations, or policies. For example, the **Philippines** adopted a clean Air Act in 1999, and in 2001 promulgated the first set of enabling regulations. The Philippines Nuclear Research Institute (PNRI) expects to be involved in the air-monitoring programme to be undertaken as part of the Clean Air Act. PNRI is also supporting another project by analyzing the samples taken in Mindanao.

82. Nuclear technology can also be used in the paper production sector. Under *BGD/8/015*, a nucleonic control system (NCS) was installed at Karnaphuli Paper Mills (KPM) in **Bangladesh** to measure and control the base weight and moisture content during paper production. Technical problems prevented the NCS from being used, and expert missions were sent in 2001 to fix the problems. KPM staff also went to Japan for fellowship training on the system. The functioning NCS was handed over to the KPM staff and has been running effectively with improved paper quality. KPM has reported back to the Agency that the cost of the NCS has almost paid for itself within one year. Other paper mills in the country are also impressed with the return on investment from the NCS, and one additional mill has ordered an NCS for its operation.

### TCDC and the Power of the Internet

The Nuclear Medicine Department at the Yangon General Hospital in **Myanmar** has three gamma cameras that it uses for nuclear medicine services. Due to limited resources and technical knowledge, the hospital was not able to regularly maintain and improve the equipment. Under *RAS/4/017, Maintenance and Repair of Nuclear Instruments*, an expert from **Sri Lanka**, who received Agency training in instrumentation and maintenance, was recruited to assist Yangon General Hospital to repair one of the gamma cameras using a computer card developed in Slovenia. With his expertise, the camera was repaired and upgraded. The expert also trained the technicians at the hospital to communicate with other technicians in the world, particularly their counterparts in Slovenia, to improve the images from the camera and receive guidance for regular maintenance and repair of the camera. This example demonstrates the effectiveness of promoting technical co-operation among developing countries (TCDC); it is an effective approach to enhance the sustainability of the technology and regional co-operation.

83. Turning to the oil industry and the uses of nuclear technology there, in White Tiger Field, **Viet Nam**, a fractured basement oil reservoir was investigated using radiotracers. The purpose of the radiotracer investigation was to determine the breakthrough paths and take corrective action to increase the “sweep” and thereby oil recovery efficiency. Three radiotracers were injected and measured in six production wells for six months. Radiotracers indicated the earlier breakthrough paths. They provided many parameters for oil reservoir characterization and helped in defining an accurate flooding model. The water injection system was optimized (closing down some nonproductive wells), and thus increasing oil recovery by 3%-5% and decreasing the operational cost, bringing significant cost-savings to PetroVietnam Oil Company. PetroVietnam Oil Company has recognized the importance and benefit of radiotracer applications, and a larger program of radiotracer investigation for evaluating the residual oil in reservoirs is planned for 2002.

84. Similarly in **Malaysia**, the Malaysian Institute of Nuclear Technology Research (MINT) has expanded its routine nucleonic gauge services to provide control and troubleshooting expertise to industrial processes. As a result of *MAL/8/016*, four techniques are available from the institute: gamma scanning, neutron gauge, corrosion monitoring, and cross-correlation flow measurement. The income of the MINT group has increased more than \$20,000 per year due to the increase in their services and client base.

### Human Health

85. Through *RAS/7/010, Measuring the Effectiveness of Multinutrient Supplementation*, counterparts in seven countries have completed or are in the process of implementing isotope-based tests to measure the bioavailability of micronutrients in preschool children and lactating and pregnant women fed on iron-fortified foods, including noodles, wheat, flour, fish and soy sauce. The national governments and food industries in **China, Indonesia, Thailand, and Viet Nam** have been very receptive to these studies and are developing national policies on food fortification based on the results of the isotope studies. There is also considerable co-operation between many of the countries involved in this regional project. A co-ordination meeting held during 2001 confirmed the desire and developed a plan to not repeat studies between countries, but to use the results from one country and take it further or add to the study in the next country.



86. Screening newborns for hypothyroidism has expanded to cover most of the region. Significant progress has been made, and by the end of 2001, more than 1.3 million babies have been screened since work began in this area, diagnosing some 360 cases of hypothyroidism and treating them. In 2001, the number of babies screened increased by 73% compared with total for 2000. Another benefit from *RAS/6/032* is the TCDC through partnership between developed and developing partner screening centres within the region. Two national projects in the **Philippines** and **Thailand** focused on advanced aspects of radio-immunotechnology, such as indigenous biotechnology, screening automation, and laboratory information systems. To strengthen the training activities, an IAEA state-of-the-art congenital hypothyroidism interactive multimedia teaching software with scoring system, developed in West Asia, was also introduced to the region. Two national web sites on screening were established to disseminate the regional screening achievements and promote screening activities. Interaction between project co-ordinators and international screening experts were also established through the 4<sup>th</sup> Asia-Pacific Regional Meeting of the International Society for Neonatal Screening. This provides additional global scientific inputs into future regional screening projects.

87. Heart disease and cancer patients in **Mongolia** receive diagnostic services from a single photon emission computed tomography (SPECT) camera donated by the USA and training provided through the Agency. In 2001, the number of scans increased to 4,532, which is 15% higher than in 2000. Baseline data from 1996 indicate that the number of investigations in 2001 is 114% higher than in 1996. In addition, new diagnostic methods, such as dynamic scintigraphy, perfusion scintigraphy, and static mammoscintigraphy were introduced. Government cost-sharing helped **Sri Lanka** improve radiation therapy at Kandy General Hospital. Under *SRL/6/025*, a new teletherapy machine was purchased with governmental funds, and the Agency assisted with the purchase of a low-dose rate brachytherapy machine and treatment planning system. Also in Sri Lanka, Colombo General Hospital produced reagents used in hypothyroid testing on a pilot scale. The reagents have been distributed to other hospitals for testing on quality and how they compare with imported reagents. A possible outcome could mean savings from not having to import reagents used in the radioimmunoassay (RIA) of thyroid hormones.

## Food and Agriculture

88. Due to the increase in demand for livestock products, additional animal feed is needed. During the dry season in the region, animal feed, such as grasses, are in short supply, and the animals are fed with agro-wastes, but the nutrition value of these wastes is low. Therefore, agro-wastes need to be upgraded into a more nutritious food for livestock. Optimal protein target levels can be achieved in the agro-waste using radiation-fermentation technology. A project co-ordination meeting was held in **Malaysia** in 2001. During the three-day meeting, the 12 project co-ordinators presented results of current research and implementation plans from their respective countries. Through *RAS/8/087*, the feasibility of this technology has been economically proven. In **Bangladesh, China, India, Indonesia, Republic of Korea, Pakistan, Sri Lanka, and Thailand**, the process of upgrading agro-waste is at the lab-scale. The **Philippines** is initiating a pilot plant to produce upgraded agro-waste from sugar cane bagasse for livestock feed. In **Malaysia**, MINT is upgrading their pilot plant in partnership with the private sector to increase production of animal feed.

89. In **Mongolia**, continuous cropping has left the soil in poor condition, consequently decreasing crop production. The production of rhizobium biofertilizers and its use on local varieties of legumes produced promising results. In 2001, several field days and seminars were held with local farmers to familiarize them with the fertilizer. To reach additional farmers, links were established with three extension centres in Darkhan, Dornod, and Hovd.

90. In **China**, the introduction of nitrogen biofertilizers rather than chemical nitrogen fertilizers for wheat would use locally available materials and decrease the cost of producing wheat. Under *CPR/5014*, an expert from **Pakistan** went to China and assisted the counterpart to establish a microbiology laboratory as well as train the counterpart in the isolation and characterization of rhizobium strains. The counterpart, Gansu Agricultural University was so pleased with the expert assistance it received, that it designated the expert as "Honorary Professor".

91. As has been demonstrated in other regions, an area-wide integrated approach to control fruit flies is the only way to fight infestation and open the door to crop exports. Under *THA/5/046*, a pilot test area in Rachaburi, **Thailand**, was selected and more than 10 million sterile male flies (using SIT) were released in 2001. The counterpart selected another pilot area in Pichit, and the release of sterile male flies will begin in 2002. To maintain the supply of sterile male flies, the mass rearing facility has expanded its capacity to producing more than 40 million flies per week, more than enough to cover the needs of the pilot studies.

## **Water Resources Management**

92. **Indonesia** and the **Republic of Korea** signed a memorandum of understanding in Vienna on 10 October 2001. The memorandum between the two countries covers a preliminary economic feasibility study for a nuclear desalination plant in Indonesia. This study will be conducted under the auspices of *INT/4/134* and the National Nuclear Energy Agency (BATAN) of Indonesia and the Korea Atomic Energy Research Institute (KAERI). *INT/4/134* is an interregional project for coupling nuclear power and desalination plants to produce potable water and electricity, and includes nine other countries: **Argentina, China, Egypt, India, Islamic Republic of Iran, Morocco, Pakistan, Russian Federation, and Tunisia**.

93. *CPR/8/013, Assessment of a Nuclear Single-Borehole Tracer Probe for Dyke Piping Studies*, fielded an expert from Sweden to assist the counterpart in using a radio-isotopic technique to identify "piping" in the Beijing Dyke, **China**. The expert reported that the equipment developed by the project counterpart is robust, easy to handle, and simple to use. Using this technique, the counterpart proved his own hypothesis: that the leakage from the Yellow River at the Beijing Dyke is through the bedrock and not through the dyke itself. Other countries in the region will benefit from this project through a planned workshop in 2002 that will demonstrate the equipment and methodology used for data analysis in radioisotope techniques.

## **Nuclear Safety**

94. Under *CPR/0/009, Support for NPP Senior Management Personnel*, an innovative management approach was taken between Qinshan Nuclear Power Corporation (QNPC) in **China** and three other nuclear power plants (NPPs): Electricité de France (EDF), Arkansas Nuclear One (ANO) of USA, and Kori Nuclear Power Plant of the **Republic of Korea**. Senior managers of QNPC reviewed safe operation plans and identified what could be replicated at their own plant from the three other NPPs by visiting the plants. The enhancement plan covered best practices identified between QNPC-EDF, QNPC-ANO and QNPC-Kori. This approach was very effective in identifying and implementing the project activities into a practical work plan that could be followed throughout the project. Based on lessons learned and good practices observed through the project activities, a Five Year Development Plan of QNPC was developed with clear milestones and performance indicators to improve the management and safety culture.

95. So far, 30-40 changes have been incorporated into the management process at QNPC and many have either been implemented or are in the process of implementation. Examples of changes and initiatives taken at QNPC include the following: enhanced work planning programmes have been developed and are being implemented; and staff ownership of the enhancement programmes is being encouraged through several communication initiatives such as the production of various booklets related to safety culture and their access through the intranet to all staff. The working arrangements for the Nuclear Safety Committee, which was established in 1998, have been changed. More independent review is provided and more QNPC senior managers now provide additional insight to the committee.

96. At the request of **China, Republic of Korea, and Pakistan**, and based on the findings and recommendations of the OSART missions, a regional project (*RAS/9/022*) was launched in 1999 to improve occupational radiation protection in nuclear power plants by applying the optimisation principle, ALARA (as low as reasonably achievable), in accordance with International Basic Safety Standards (BSS). Through project activities, ALARA awareness and the number of trained personnel has increased, task-specific dose information has been made available, and regulatory authorities have initiated ALARA practices in NPPs. As a result, counterparts report the collective dose to workers at NPPs has been reduced from 0.71 man Sv/reactor in 1998 to 0.59 man Sv/reactor in 2000 for China, and from 1.04 man Sv/reactor in 1998 to 0.77 man Sv/reactor in 2000 for Republic of Korea. Harmonized training materials were developed under this project, as well as train-the-trainer workshops.

## **Radiation Protection**

97. Since the inception of the Model Projects on the upgrading of the radiation protection infrastructure (*RAS/9/021, RAS/9/026, and RAS/9/027*), significant progress has been made by the participating Member States in East Asia. During 2001, **Mongolia** promulgated their radiation protection law and established the Nuclear Energy Commission as the regulatory authority. **Pakistan** enacted its new Pakistan Nuclear Safety and Radiation Protection Ordinance, establishing the independent Pakistan Nuclear Regulatory Authority, thereby fulfilling an important requirement of the International Basic Safety Standards. **Bangladesh** has met Milestone 1 with the completion of an inventory of radiation sources, thereby bringing all known sources under regulatory control. It also put in place a system of notification, authorization, inspection, and enforcement.

98. Thirteen students from **Bangladesh, Mongolia, Myanmar, Sri Lanka, and Viet Nam** completed the first one-year graduate-level, diploma course at the National University of Malaysia, Bangi. This post-graduate course in radiation protection and safety of radiation sources was established through the Agency under *RAS/9/027*.

### 3. Europe

99. The **Federal Republic of Yugoslavia** and **Azerbaijan** joined the Agency in 2001 bringing the total number of recipient states in Europe to 27. Through a Programme Reserve project, *YUG/4/028, Safety of Irradiated Fuel and Radioactive Waste at Vinca Research Institute*, expert services and equipment were provided to assist in solving some of the most urgent safety issues related to irradiated fuel and radioactive waste of the RA research reactor in the institute.

100. A major challenge remained the delivery of the safety and security related programme. Nuclear security has of course been part of the programme for several years, in response to the expressed needs of Member States. In light of recent events, particular attention has been focused on a cluster of regional and national projects, which had the overall objective of raising safety and security in those Member States.

101. Through *RER/0/015*, a regional workshop for lawyers and regulatory officials on the effective implementation of national nuclear energy legislation was held in Malta in November 2001. The participants represented 23 countries. During the workshop, participants followed up on the group training in nuclear law provided to member States in the region during 1997-1999, and updated information on the status of national nuclear legislation in these countries.

#### Nuclear Security

102. Member States in the Europe region have been engaged in a variety of activities relevant to protecting against nuclear terrorism, including projects to ensure physical security, to help prevent and respond to illicit trafficking of nuclear material and other radioactive sources, to promote the safety of nuclear facilities, to upgrade radiation protection and waste safety infrastructure in 18 Member States with special attention to creating a system for control of radioactive sources, and to assist Member States in responding to emergencies.

103. Among the projects included in the cluster referred to above, *RER/9/060, Physical Protection and Security of Materials*, was an important vehicle for assisting recipient Member States in Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS) to improve their nuclear security. Through this project, Agency assistance reached a new constituency, the law enforcement officers. A customs or police officer on duty needs to know not only how to prevent or respond to the case of nuclear smuggling but also how to protect the public and himself from a potential radiation hazard.

104. Two regional training courses for customs and police officers in Vienna and Seibersdorf were followed by the workshops in **Azerbaijan, Belarus, Kazakhstan, and Ukraine**. Such national workshops focused on the country-specific issues and needs. A meeting of heads of customs of the CIS hosted by the Russian Customs Academy in April 2001 helped increase the awareness of high-level decision-makers of the problems as well as of the ways the Agency can assist them. This was followed by two new regional train-the-trainers courses of one-month duration hosted by the Russian Customs Academy. The project incorporated the most recent developments in the field. Various international organizations, including Interpol, World Customs Organisation, and the Institute for Transuranium Elements of the European Union also made contributions to the project.

105. During 2001, one additional theme was added to project activities, namely, support to law enforcement authorities in identification and categorization of seized nuclear materials (including the so called “nuclear forensics”). More than 450 law enforcement officers in the region have so far received training under this project.

## **Radiation Protection**

106. The activities in the field of radiation and waste safety focused on upgrading and strengthening the infrastructure for the regulatory control of radiation sources and exposures to ionizing radiation. These tasks were carried out mainly under Model Projects *RER/9/062, National Regulatory Control and Occupational Radiation Protection Programmes*, and *RER/9/065, Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure*, which followed Model Project *RER/9/056, Upgrading Radiation Protection Infrastructure*, originally involving 11 Member States in Europe. Member States recognized that this approach was an efficient means of establishing a fully operational regulatory system compatible with the principal requirements of the International Basic Safety Standards (BSS). Consequently, the number of countries participating in projects *RER/9/062* and *RER/9/065* increased in 2001 to 18; they include **Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Georgia, Hungary, Latvia, Lithuania, Malta, Portugal, the Republic of Moldova, Romania, Slovenia, The former Yugoslav Republic of Macedonia, and Turkey.**

107. In both projects, training activities played a significant role, in addition to expert services and equipment for inspection, radiation monitoring, and quality control. Through various training modalities – postgraduate, regional and national training courses, fellowships, and scientific visits – more than 500 persons from regulatory authorities and major users of radiation sources in participating countries were trained in 2001. All training courses strictly followed generic syllabi developed by the Agency, reflecting the BSS and other aspects of the latest internationally accepted recommendations. The available materials will serve as teaching guides for use in regularly organized national training courses, which are becoming an essential part of a self-sustainable educational programme in participating Member States.

108. The importance of the training component and the positive effects it has in dealing with various radiation protection problems of a country – including emergency situations - can be illustrated in **Georgia**. Personnel of the Nuclear and Radiation Safety Service (the Georgian Regulatory Authority established with IAEA assistance provided under *RER/9/062*), other local specialists trained within the framework of TC projects, and the Agency itself significantly contributed to solving problems caused during the radiation accident involving two orphan sources found in a remote area of the country in December 2001.

## **Nuclear Safety**

109. The co-operative effort to improve safety at existing nuclear power plants in Europe carries significant benefits, such as the reduction of the likelihood of a nuclear accident which provides protection for Europe’s public, economic, and environmental health, and promoting a dialogue on nuclear issues such as safety and regulatory aspects. Through the safety-related TC regional programme in Europe, this dialogue has engaged many international and national organizations, including the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development, the European Bank for Reconstruction and Development (EBRD), the Institute of Nuclear Power Operations (INPO), the World Association of Nuclear Operators (WANO), the European Union (EU) assistance

programmes, the European Atomic Forum (FORATOM), and the US Department of Energy (US DOE) and the US Nuclear Regulatory Commission (US NRC).

110. A priority for 2001 was to continue enhancing the effectiveness of nuclear regulatory authorities in Europe's recipient Member States to respond to new regulatory challenges, maintaining their technical competence, independence, and governmental and public confidence. The new regulatory challenges arise from issues such as reactor ageing and lifetime management, regulatory use of probabilistic safety assessment (PSA), and decommissioning. The challenges to safety from privatization and energy market deregulation activities additionally pose special problems. To respond to some of these issues, several IPSART (International Probabilistic Safety Assessment Review Team) and IRRT (International Regulatory Review Team) missions were conducted. In addition, two training courses, "Basic Nuclear Safety" for new professionals joining regulatory authorities and "Regulatory Control of NPPs", were organized under *RER/9/061*. Agency experts developed the training material for both courses based on best practices and the IAEA standards; the materials used in the course were also provided to the participants in CD format for review at a later date.

111. Another challenge for regional co-operation was the co-ordination of emergency arrangements with other countries, which requires planning and formal agreements. Without co-ordinating mechanisms between Member States, there is a strong potential for severe disruption and public disquiet in the event of an accident, particularly in neighboring countries where reactors are near borders. Under *RER/9/064*, several workshops and technical meetings were organized in both Russian and English covering emergency exercise preparation, conduct, and evaluation; development of training material and emergency procedures; and a train-the-trainers course on responding to radiological emergencies.

112. Achievements were made in improving the safety of near-surface waste disposal facilities during 2001. In CEEC and the CIS, a number of disposal facilities are being used for types and quantities of radioactive waste for which they were not designed, and thus safety assessments for many of these sites are inappropriate for waste deposited there. Through project *RER/9/067*, extensive regional efforts were concentrated on improving the technical capacity, efficiency, and safety of existing waste management facilities; on assisting responsible staff in defining the most efficient ways to improve existing waste management practice, and on upgrading technical knowledge of key operational personnel. In addition, a number of training courses and workshops promoted exchange of experience among the participants. The training material used was updated by regional experts and then distributed to all participants on CD.

113. The ongoing safety- and power-related regional projects in Europe, such as *RER/9/049*, *RER/9/066*, *RER/9/068*, and *RER/9/070*, in addition to the above-mentioned projects, were instrumental in strengthening the safety culture at counterpart institutions. The achievements of Member States who are candidates for European Union (EU) membership were noted by the European Commission (EC) officials on several occasions during 2001.

## Research Reactors

114. Activities under *RER/9/058*, *Safety Review of Research Reactor Facilities*, focused on providing support to Member States for the return of research reactor spent fuel to the country of origin. Countries participating in this project are those with research reactors built by the former Soviet Union and that have expressed interest in returning the spent fuel to Russia for reprocessing or storage. Within the framework of IAEA-Russia-USA tri-partite discussions on the return of Russian-origin fuel, three fact-finding missions to **Ukraine**, **Uzbekistan**, and **Federal Republic of Yugoslavia** were organized under this project with

active TC participation. Experts from the **Russian Federation** and USA were part of the missions. As a result, inventories of research reactor fuel were identified for shipment at each site in question; detailed information of the physical and mechanical state of the fuel to be shipped and spent fuel storage facilities was obtained; local handling equipment, transportation casks and transportation routes, which could be employed, and the number of shipments that might be required were assessed; and a detailed assessment of the physical, technical, administrative and financial resources that would be required to ship the fuel from each site to Russia were made. According to agreed plans, the first shipment would start from Uzbekistan in 2002 after legal and commercial issues are agreed upon between the United States, Russian Federation, and Uzbekistan. The ramifications of these decisions are a step towards increased nuclear safety and security in the region.

### Decommissioning of Nuclear Facilities

As an example of partnering with other organizations, the Agency programme in decommissioning of nuclear facilities in Europe has been recognized for its planning process within the European Union. Decommissioning assistance included national projects for **Bulgaria, Lithuania, Slovakia, and Ukraine**. The Agency's overall commitment of resources to Bulgaria, Lithuania and Ukraine was co-ordinated with the multinational and bilateral financial assistance mainly provided through European Bank for Reconstruction and Development (EBRD). The Agency's assistance was focused on technical advice and training in connection with decommissioning of nuclear power plants with the main objective to assist the governments in planning management and safety reviews of the decommissioning process.

### Environmental Remediation

115. Agency environmental remediation programmes at national and regional levels are supported by local governments as well as other international organizations, and the nuclear techniques involved in these projects plays a significant role.

116. For example, the objective of the Dnieper Basin Environmental Programme (DBEP) is to develop a Strategic Action Programme, including implementation mechanisms to protect Europe's third largest river in a sustainable manner, and through this, to contribute to the protection of regional and global international waters. The first activity of the DBEP is the completion of transboundary diagnostic analysis (TDA). The Agency's involvement consists of a finalization of the TDA for all aspects related to environmental radioactivity, including the Chernobyl accident impact assessment. Working with counterparts from **Belarus, Russian Federation, and Ukraine**, as well as partner agencies (IDRC, UNIDO, UNEP, and UNOPS), a draft Terms of Reference became part of the Interagency Agreement, which was signed in December 2001. Past experience associated with *RER/2/003* and its experts will facilitate the required site assessments and collection of relevant data for the TDA.

117. Disaster relief after the Chernobyl accident dealt with serious environmental, psychological, and economic impacts. The Agency's response continues 15 years after the accident. An example of successful environmental remediation was demonstrated through *BYE/5/004, Edible Oil from Rapeseed Grown on Contaminated Land*, which completed its second phase in 2001. The Agency support laid the groundwork for a pilot-scale refinery near a sawmill in Mozyr, **Belarus**, and for a quality control and analysis laboratory of both raw materials and end products in line with international standards. A pilot plant on a farm in Pripjat produced food-grade oil, practically free from radionuclides, from rapeseed grown on contaminated lands. The facility is foreseen to produce more than 4,000 tons of rapeseed oil

with a concentration of radionuclides 40 times lower (0.3-0.7 Bq/l) than the national permissible level (40 Bq/l). This project demonstrated to farmers that their land could be recovered for safe and productive uses.

### **Self-reliance of Nuclear Institutes**

118. Members of the Black Sea Economic Co-operation Organization met, upon the initiative of **Turkey**, to take stock of the abilities of regional nuclear institutes and discuss the challenges the institutes faced in becoming self-reliant. The meeting was chaired by **Slovenia**, which has a well-established Centre of Excellence (Nuclear Training Centre "Milan Copic") and has successfully made the transition from being government-funded to self-reliant. The participating 11 Member States (**Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Russian Federation, Turkey, and Ukraine**) had the opportunity to share experiences as well as discuss opportunities for involving non-governmental and industrial organizations in additional regional co-operation efforts. The meeting, organized under *RER/O/021, Education and Training in Nuclear Sciences and Technology*, also identified possible collaborations at the regional and institutional levels to train young professionals, which is key for self-reliance of institutions and preservation of knowledge.

119. A regional project in Europe on QA/QC of nuclear analytical techniques contributed to the promotion of self-reliance of nuclear centres and nuclear laboratories. Most of these laboratories had been government supported, and as a result of the political and economic changes in the region, many of them lost both their support and their clients. They were thus faced with the choice of either closing down or improving the quality of the services they provided to attain the required standards to compete in the marketplace. *RER/2/004, Quality Control and Quality Assurance of Nuclear Analytical Techniques*, which started in 1999, aimed at implementing a comprehensive QA/QC protocol in accordance with ISO/IEC 17025:1999. Support was given to ten participating laboratories with the objective of reaching a level at which the QA system is sustainable and appropriate for formal accreditation or certification by national authorities. The participating laboratories succeeded in improving their credibility and demonstrating their reliability to clients. They were able to meet important requirements of the European Union and thus remove barriers to trade.

## **4. Latin America**

120. Several National Authorities in Latin America felt the urgent need for addressing rapidly changing development patterns and for a fresh look and reassessment of the role of the nuclear sector in achieving sustainable development goals through strategic planning. Through the support of the *RLA/O/020, Strengthening the Institutional Infrastructure in the Nuclear Sector Through Strategic Planning*, to date all participating countries completed training in strategic planning according to their specific needs. **Brazil** has put this training to use by defining performance indicators for the current year. Two additional countries, **Bolivia** and **Uruguay**, have already initiated a systematic analytical process to assess their respective nuclear sector's strengths, weaknesses, and opportunities in order to formulate comprehensive medium- and long-term strategies. During the upstream work in 2001, the Agency, along with the participants in the region, worked on a proposal to continue to provide tools for self-reliance and sustainability of the nuclear sector.



121. A new initiative in 2001, with the support of *BRA/0/017, Human Resource Development and Nuclear Technology Support*, and the then TC Evaluation Section helped **Brazil** to perform a participatory evaluation of the results and impact of the technical co-operation programme in order to learn from the past experiences and improve future programmes. The first phase consisted of training the core Brazilian staff to develop a methodology and then an evaluation exercise of a few TC projects. The outcomes of this first year show that many improvements can be made at the project level and national technical co-operation programme level in order to improve the efficiency, results, and impact of the programme. It is expected that during the second year (2002), Brazil will apply the lessons learned and develop an expanded participatory evaluation effort of the past ten years of technical co-operation with Brazil.

122. Since 1998, **Haiti** has not had any national TC projects, but in 2001, activities were revived with a mission that led to a programme for manpower development and capacity building. Following the mission, 20 technical staff of the water and environment sector from Haiti were trained on the application of isotope techniques to address water management problems. In addition, a course on energy planning was organized for 14 energy sector staff. Human resource development efforts have been initiated in the health sector. The efforts for establishing the radiation protection regulatory body in Haiti have likewise increased through *RLA/9/041*.

## Human Health

123. *RLA/7/008, Using Isotopes to Evaluate Nutrition Intervention Programmes*, not only had an impact on the nutrition of children in Latin America, it also led to the formulation of policies and additional government investment to sustain the capabilities enhanced by this project. The modification of national policies for the implementation of the National Supplementary Food Programme in **Chile** has reduced anaemia in a sample of 300 children from 30% to less than 5% within a year after foods fortified in iron and zinc were introduced. This result is expected to positively affect the children's educational performance and decrease infections. The importance of employing isotope methodologies in nutrition studies led **Mexico** to purchase two mass spectrometers to assess the effect of food supplements in pregnant and lactating mothers and determine the impact of iron and zinc food fortification in the recipient population. In **Brazil**, \$40,000 was allocated by the Government for the first large-scale epidemiological study employing isotopes to measure the body composition in 300 under-nourished children who have participated for six months in the nutrition programme.

124. Prior to this regional project, data on energy expenditures were based on surveys from developed countries. No data existed from Latin America to provide a scientific basis to formulate food programmes suited to the local conditions or population. A comparison of data recently obtained under the project indicates that the existing values overestimate energy needs in children under the age of 7 years. As a result, Chile recognized that the energy intake of children must be reduced in order to prevent obesity, which is an increasing problem in countries considered to be in "nutrition transition". The results of investigations on energy expenditure of young children in Cuba and Chile based on doubly-labelled water are now being used by the FAO/WHO/UNU expert committee convened during 2001 to establish the new energy recommendations for Latin America.

### An Investment in 1996 Saves Lives in 2001

The Agency has worked with Latin American countries on tissue banking since 1996 through national and regional projects such as, *ARG/7/005*, *CUB/7/005*, *MEX/7/008*, *PER/7/002*, and *RLA/7/009 (ARCAL LIX)*. At present, seven countries (**Argentina, Brazil, Chile, Cuba, Mexico, Peru, and Uruguay**) have a total of 37 associated tissue banks.

On 21 December 2001, the explosion of fireworks in a popular commercial centre in downtown Lima, **Peru**, provoked one of the biggest fires Lima has ever suffered. In this tragic event, almost 400 people died and more than 60 people were treated for serious burns. The Peruvian Tissue Bank had already planned to produce and irradiate a larger quantity of tissues in December because during Christmas and New Year the incidence of accidents by fire increases due to setting off fireworks. But they did not expect a tragedy of such magnitude. Before the tragedy, the tissue bank irradiated 80-120 dressings per week, but since the 21st of December, production was increased to approximately 1,600 dressings per week. The Agency sent two plastic surgeons, specializing in burns, rehabilitation, and application of irradiated tissues, and a specialist on irradiation techniques. One of the experts sent to Peru was from **Cuba**, and he brought along grafts from their tissue bank to help Peruvians with the demand for treatment. Since the incident, public awareness of the need for tissue banks and of the irradiation techniques used to sterilize the samples has been considerably raised.

125. Health issues know no border; and **Ecuador** and **Peru** are proving that medical services know no border either. Through the bi-national project *RLA/6/047, Strengthening the Nuclear Medicine Services in the Border Region of Ecuador and Peru*, Peruvians and Ecuadorians living in the border region have access to radiotherapy treatment for cancer. The co-ordination and collaboration between the hospitals of Loja (Ecuador) and Chiclayo (Peru) have been established and contribute significantly to address the demand for nuclear medicine services in this border region.

126. The repair and maintenance of radiotherapy dosimetric instrumentation and the calibration of electrometers used in radiotherapy are key elements to provide the correct dosage for patient treatment. Eleven countries are participating in *RLA/4/014 (ARCAL XXXIV)*, and each now has its own national laboratory. Regional centres for calibration, repair, and maintenance of radiotherapy instrumentation and electrometers have been established in **Brazil, Cuba, and Mexico**. Seventy-five pieces of equipment have been repaired so far, resulting in savings.

127. Partnering with the National Oncological System (SON) and government authorities, the Agency is helping **Costa Rica** to create the Costa Rican Institute Against Cancer (ICCC). Through *COS/0/003*, several expert missions have been provided, significantly contributing to the identification and preparation of the technical specifications for the pieces of equipment to be purchased by the Institute. Agency assistance has already had an impact on the counterpart's negotiation position with potential suppliers by helping the Institute prepare accurate and specific bids. The Institute also has set aside a large sum of funds devoted to training personnel with the Agency's help.

## Environment and Water Resources Management

128. Through *RLA/8/031, Sustainable Management of Groundwater Resources*, 30 institutes in **Chile, Colombia, Costa Rica, Ecuador, Paraguay, Peru, and Uruguay** worked together to solve problems of water shortages and mismanagement of water resources using isotope techniques and other conventional methods to gather data about an aquifer system. Field sampling and measurements have already been initiated in 12 aquifer systems of the region, and the results are posted on an Internet site hosted by the University of Piura, Peru, for easy access to all participants. To date, 41 counterparts have been trained on the application of isotopic tools for assessing water quality and quantity problems.

129. In the area of power production, *RLA/8/032, Application of Isotope Geochemistry in Geothermal Development and Environmental Management*, played a small but key role in managing the reservoir and sustaining steam supply for the power plants. The capabilities of the counterparts were enhanced to integrate isotope technology into identifying geothermal reservoirs. Results obtained through the project were used to support requests from other development organizations, which, in the end, helped to increase the capacity of power plants and to sustain operation of all the geothermal production fields. In addition, the contribution of geothermal energy to the national energy mix in **El Salvador** increased from approximately 18% to 23% in 2001. Geothermal power plants in **Costa Rica, El Salvador, Guatemala, and Nicaragua** upgraded analytical facilities and invested in human resources. Further, the participation of **Panama** in the project has raised the Government and public's awareness of the importance and advantage of geothermal resources in the country. This resulted in a comprehensive national programme for geo-scientific exploration of Baru-Colorado, the most promising geothermal prospect in the western part of the country, as well as a nationwide inventory and preliminary assessment of geothermal manifestations in the country.

130. The investigation of the two additional geothermal prospects in **Nicaragua** shows that both areas have reservoir temperatures of about 230°C and 160°C and may attract the investment and development by the private sector for electric power generation. This development may augment the current supply of electricity from the Momotombo geothermal field. In conjunction with *RLA/8/032*, Costa Rica is meeting its increased electricity demand by developing geothermal resources. As a result of previous technical co-operation projects in **Costa Rica** and **El Salvador**, the countries have developed strong technical expertise in the management of re-injecting spent geothermal fluids to avoid unnecessary cooling of the reservoir as well as in the analytical techniques. As an example of technical co-operation among developing countries, Costa Rica and El Salvador are sharing their expertise with the participants of *RLA/8/032*.

## Industrial Applications

131. Quality assurance and quality control (QA/QC) in analytical laboratories is important in the Latin America region. *RLA/4/013 (ARCAL XXVI)* increased the performance of participating laboratories in 12 countries. The two main objectives of the project were to design and implement a QA programme for the participating laboratories based on the ISO 17025:1999 standard, and to achieve accreditation by a national authority, or recognition by the IAEA of at least one laboratory per country. Originally, 50 laboratories were selected to participate, which used nuclear techniques such as neutron activation analysis, x-ray fluorescence analysis, gamma spectrometry for radionuclide determination, atomic absorption spectrometry and inductively coupled plasma for analysis of materials such as water, minerals, soils, sediments and milk powder.

132. At the end of 1999, 34 laboratories were participating actively in the project, all of which prepared quality manuals and laboratory procedures suited to their needs. In 2001, six participating laboratories had achieved accreditation with the corresponding national accreditation authority, and the other 28 had well-established QA schemes in accordance with international standards and are expected to reach national accreditation in 2002. An active electronic network has been established among the 34 laboratories, which continues to permit fast and effective sharing of experience and information. The continuous development and standardization of terminology and laboratory procedures facilitates reliable comparison of analytical data and thus promote increased trade in the region.

133. Another recently completed project in **El Salvador** assisted laboratories to establish a basic infrastructure for nuclear analytical techniques that are being used in areas such as industrial applications, evaluating geothermal resources, mineral prospecting, environmental studies, and assessing the impact of the use of fertilizers and pesticides. The isotope laboratory in El Salvador continues to provide analytical services to the region. Within the framework of the project, the Agency supported counterparts in reaching current international standards for good laboratory practice and QA/QC. The project helped local specialists to learn about the requirements of the ISO standards and contributed to establishing QA/QC programmes in analytical laboratories, which are currently in the process of being implemented in order to achieve certification.

134. **Cuba** has transformed its food irradiation plant into a very competitive multi-purpose irradiation plant to address the demand for sterilization and treatment services for foodstuffs and medical products for major socio-economic sectors in Havana and neighboring areas. Through *CUB/8/019, Integrated Validation of the Product-I Multi-Purpose Irradiation Facility*, the diversified plant has now a capacity of 110,000 Ci, and it is estimated to sterilize approximately 6,000 m<sup>3</sup> of product per year.

## Radiation Protection

135. Fourteen countries in the Latin America region are now participating in the Model Projects RLA/9/041, National Regulatory Control and Occupational Radiation Programme, and RLA/9/044, Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure. Clear progress has been achieved by the participating countries in establishing operational control systems based on the International Basic Safety Standards (BSS) requirements and regulatory control of sources and practices in **Bolivia, Costa Rica, Dominican Republic, Guatemala, Nicaragua, and Panama**. **Haiti** began participating in the Model Project in 2001 with strong government commitment. **Venezuela** initiated the process to be included in the Model Project and an expert mission was fielded to assess the existing national radiation protection infrastructure in the country. The Peer Review Mission to Nicaragua showed that relevant progress had been achieved regarding Milestones 1 and 2 and the establishment of a national system for notification, authorization, inspections, and enforcement. During 2001, approximately ten professionals from the region received diplomas under this project, at a post-graduate training course organized in Argentina by the National Atomic Energy Commission and the University of Buenos Aires.

## 5. West Asia

136. The number of Member States in West Asia region increased to 15 as a result of Tajikistan joining the Agency in September 2001. Preliminary contacts were established with the country on matters relating to Agency technical co-operation through national and regional programmes.

137. As in past years, a few Member States benefited mainly from regional activities without having a significant national technical co-operation programme. The implementation of the programme approved for Iraq for the biennium continued to be on hold as directed by the UN Sanctions Committee.

### Radiation and Waste Safety

138. Work continued in the region towards the attainment of the Milestones identified in *RAW/9/008, National Regulatory Control and Occupational Radiation Protection Programme* and *RAW/9/009, Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure*. Three of the nine originally participating countries in the Model Projects have met the requirements of Milestones 1 and 2. Five additional countries have established operational facilities for major activities of Milestone 2. Two countries in the region also joined these projects in 2001.

139. Training activities received particular emphasis under the two regional projects in radiation protection. The train-the-trainer approach was key to programming in the area. More than 120 technical and regulatory staff from national regulatory authorities in the region were trained through fellowships and scientific visits, and in particular through long-term Post Graduate Training Courses (PGTC) and short-term specialized training events. The first one-year PGTC, held in Arabic at the Higher Institute of Applied Sciences, Damascus, **Syrian Arab Republic**, on Radiation Protection and Safety of Radiation Sources was successfully concluded in June. The second course started in September with the participation of 20 students from nine countries, three of them were students from North Africa who took advantage of the course being offered in Arabic. In addition, four regional training events were devoted to specialized radiation safety tasks in the areas of assessment of occupational exposure due to external radiation sources, Syrian Arab Republic, the safe transport of radioactive material, **Lebanon**, organization and implementation of a national regulatory programme for the control of radiation sources, **Islamic Republic of Iran**, and quality assurance in radiotherapy, **Jordan**. One workshop on radiation and waste safety infrastructure was held in March in **Bahrain** as a joint activity with the Gulf Co-operation Council. The main purpose of this joint activity was to harmonize the approaches used in the Gulf countries.

### Nuclear Safety

140. The key to nuclear safety is having trained people and standard procedures in place. In 2001, the Atomic Energy Organization of Iran (AEOI) strengthened its capabilities by developing a comprehensive personnel training system. The Agency also assisted AEOI in its on-going review of the Preliminary Safety Analysis Report (PSAR) in order to identify areas for improvement, elaboration, and amendments (*IRA/9/015* and *IRA/4/029*). In addition, the Iranian Nuclear Regulatory Authority received technical advice and training to prepare itself for undertaking the PSAR review when the time comes. The Government of

the **Islamic Republic of Iran** showed its commitment to strengthening safety and regulatory controls by providing significant cost-sharing with the Agency.

### Personnel and Infrastructure Are the Priority

**Kazakhstan** has a fairly wide variety of nuclear facilities, which require a considerable number of qualified and well-trained personnel to run them in an efficient and safe manner. This poses a great responsibility and challenge to the Atomic Energy Committee of Kazakhstan (KAEC), which has been assigned the responsibility for the training, qualification, and authorization of personnel involved in nuclear activities. The Agency has helped KAEC, through the project *KAZ/9/006*, to develop a number of documents on personnel-related issues, as training and infrastructure building became the priority for the counterpart. Two regulatory guides, one on the development and conduct of authorization examinations of the personnel, and the other a glossary of terms for the field of nuclear facility personnel qualification, recruitment, selection, training, and authorization, have already been formally adopted by the Government and integrated into the regulatory framework.

In addition, Agency assistance developed, delivered, and installed a database that manages the authorization of personnel qualified to conduct activities in the field of atomic energy. This system also contains a set of examination questions on Safety Standards and Radiation Protection to assist the regulatory authority in conducting the authorizing examination in this field. The KAEC now requires qualifying on this examination for all persons working in nuclear facilities.

The availability of these documents and the related training in their use have reinforced the role of the counterpart organization, KAEC, and resulted in a considerable enhancement of the counterpart's ownership, commitment, knowledge, and skills in the development of their national infrastructure for personnel development.

## Human Health

141. Fluorinated radiopharmaceuticals are used to diagnose cardiological, oncological, neurological, and psychiatric diseases. Under *ISR/2/013, Production of Fluorinated Radiopharmaceuticals*, the Agency assisted **Israel** in establishing a fully automated module to produce these radiopharmaceuticals for use in nuclear medical centres. Quality control measures related to the production of positron emission tomography radiotracers as well as cyclotron target technology assured the availability of the short-lived radionuclide.

142. Last year, screening for hypothyroidism in newborns was expanded to as many peripheral laboratories as possible under *RAW/6/003, Screening of Newborns for Thyroid Deficiency*. This year, a software package was developed for self-directed learning to sustain and expand the knowledge base transferred through the project's activities. Non-profit organizations, such as the American Academy of Pediatrics, Center for Disease Control and Prevention (USA), National Committee for Clinical Laboratory Standards (NCCLS, USA), and commercial sources contributed components to the materials used in the software, as did Agency staff and project counterparts. The material was synthesized into an interactive multimedia package that gives feedback to the user. The package was evaluated by various experts in the field and was exhibited during the 45<sup>th</sup> General Conference and the 4<sup>th</sup> Asia Pacific Regional Meeting of the International Society of Neonatal Screening, Manila, **Philippines**.

143. Although **Kazakhstan** has the potential to produce hydrogels for medical purposes locally, most of the clinics in the country use imported hydrogels, whose high cost prevent them from being used as much as they could be. Kazakhstan has developed several types of hydrogels for medical applications. In particular, a new product, "Polygel", is used as contact medium for ultrasonic diagnosis, and has been certified by the Kazakhstan Ministry of Health. Under the project *KAZ/8/002, Production of Polymeric Hydrogels for Medical Use*, the counterparts in Kazakhstan have successfully completed the licensing process for the production and use of this hydrogel. In addition, pre-clinical tests on another hydrogel composition (PHC) have been completed for its use as a base for ointment treating wounds and burns. The material is currently undergoing the process of licensing its use in drainage dressings and as the base for other ointments.

## Food and Agriculture

144. The control of the Medfly using SIT contributes to the export of fruits and vegetables. Extrabudgetary funds in support of the *ISR/5/010, JOR/5/009, and PAL/5/002, Upgrading the Area-Wide Control of the Mediterranean Fruit Fly Using the Sterile Insect Technique*, were received from United States Agency for International Development (USAID). Most of the planned activities for these projects were implemented, including the continued release of sterile male flies. The controlled Medfly population allowed **Israel** to export to the USA commodities such as tomatoes and bell peppers with an estimated value at \$8 million per year, without post-harvest treatment. For the first time, sterile male Medfly aerial release operations were initiated over an area of 2,100 ha in the Western Negev. A laboratory in Gaza was equipped with facilities for Medfly identification, and a field team of seven was recruited to set up a Medfly-trapping network, first in the Gaza Strip and then in parts of the West Bank. In addition, reliable communication links were established with the other project parties. In **Jordan**, field operations were expanded to the Jordan Valley, the main fruit-growing area north of the Dead Sea where the Medfly population-monitoring programme was initiated. Counterparts established contacts with the grower unions in the Jordan Valley to brief them on SIT for Medfly control and to assess their interest and involvement in the project activities.

145. In the case of water, more is not always better, as was found in **Uzbekistan** from field studies on soil and climatic conditions completed at three different sites under *UZB/5/002, Optimization of Water and Fertilizer Use for Major Crops*. Neutron probes were used for an accurate measurement of the moisture content in the soil. The results obtained show that high crop yields of winter wheat and sugar beet can be obtained at an irrigation level lower than those routinely used in the country. The optimal scheduling of irrigation resulted in up to 25% reduction in the water requirement of winter wheat per unit of crop in comparison with the currently practiced scheduling of irrigation, while the wheat productivity increased by 18% to 50%. Sugar beet productivity increased by about 8% for the same irrigation rate. Wide-scale adoption of the recommended irrigation and fertilization rates from these studies could result in a large impact on the agriculture sector in Uzbekistan.

## Environmental Monitoring

146. **Kuwait** made a formal request to the Agency in 2001 for assistance in the assessment of depleted uranium (DU) residue in the environment resulting from the use of DU munitions in the 1991 Gulf War. In response, the Agency approved a Programme Reserve project, *KUW/9/002, Radiological Assessment of DU-affected Sites in Kuwait*, and fielded an expert mission to the country in September. The mission held discussions with the national authorities and technical organizations, reviewed the status of the work already done by Kuwait in this regard, and visited sites to determine the number and locations for the

sampling exercise. A limited number of samples were brought to the Agency Laboratory for analysis. The results of the analytical work were discussed with the national authorities and a further course of work was agreed upon.

## Industrial Applications

147. Non-destructive testing (NDT) is a major activity in industry with highly trained personnel. The regional project *RAW/8/008* achieved considerable success in enhancing national capabilities for the training and examination of personnel in various NDT techniques according to the requirements of ISO 9712. Five out of the seven participating countries now have their national training programme in place at certification Levels 1 and 2. Training at Level 3 in various techniques was provided through regional training courses following the train-the-trainer approach. Sufficient local expertise has been developed in most of the participating countries for a systematic introduction of the ISO guidelines and national certification schemes for NDT personnel.

148. Results from *KAZ/3/002, Modern Technologies for In-situ Leaching Uranium Mining*, continue to be reported, even after the project was closed in 2000. In a report from the counterpart, laboratory researchers have demonstrated that the acid method of leaching is preferable for the type of ore that is mined in **Kazakhstan**. The results show in-situ acid leaching (ISL) as twofold better than carbonate leaching, which was the previous method used by the counterpart. The main objective of the project was to provide advice on making uranium production environmentally acceptable while preserving and/or improving its profitability and sustainability. Under this project, a custom-made laboratory-scale ISL system was provided to the counterpart for conducting studies on the leaching of indigenous ore samples and the collection of sufficient technical data for a meaningful interpretation. The project has clearly demonstrated the economic and environmental advantages of introducing modern practices into the recovery of uranium by ISL techniques and has provided valuable inputs to the essential and practical aspects needed for an environmental impact assessment (EIA). The counterpart institution can now apply its acquired expertise to develop an EIA study of the uranium mining industry which, when completed and implemented, can result in better economic performance, effective environmental management programs, as well as a wider public acceptance and support for the industry.



## 6. Highlights of Completed Projects for 2001

### Africa

Project Number	Project Title	Project Objectives	Summary Achievements
ALG/6/010	Development of the Perioperative Isotope Detection Technique	To improve the quality and efficiency of surgical operations and to reduce the number of re-interventions.	Introduction and standardization of procedures for the detection of sentinel nodes achieved. Perioperative isotopic detection techniques transferred and available to patients.
ANG/9/002	National Radiation Protection Infrastructure	To assist the Government of Angola to establish a national radiation safety infrastructure in order to comply with the International Basic Safety Standards for protection against ionizing radiation and for the safety of radiation sources.	Inventory of radiation sources, practices, and users (for the capital district) completed. Radiation protection law and regulations drafted. Radiation safety assessment visits to several medical institutions completed.
EGY/0/010	Variable Energy Cyclotron Laboratory	To establish a variable-energy cyclotron facility.	Cyclotron facility capable of producing medical and industrial radioisotopes commissioned with Russian supplier. The Egyptian Atomic Energy staff trained for the operation and use of the cyclotron facility.
GHA/4/011	Utilization of Ghana Research Reactor- Phase II	To enhance utilization of the research reactor in different areas, such as neutron activation analysis, radiotracer applications in industry and nuclear data online services.	Radioisotope techniques to petroleum and mineral processing industries for trouble shooting inspection of processing columns, tanks, vessels, pipes and chemical reactors created at the National Nuclear Research Institute.
IVC/5/024	Regional Reference Laboratory for Animal Disease Diagnosis	To assist Africa in the eradication of rinderpest on the continent and, in so doing, to contribute to technology transfer and capacity building that will promote more cost effective control of other major livestock diseases.	Procedures for the routine laboratory diagnosis of rinderpest and related diseases using conventional and immunoassays and molecular-based techniques introduced. Laboratory made a significant contribution to the eradication of rinderpest from the region.
NAM/6/003	Establishment of a Central Radiotherapy Unit	To establish a central radiotherapy unit for curative and palliative cancer treatment and to train national radiotherapists and radiation physicists.	On average, 450 radiotherapy patients treated annually. This represents an increase of 50% over the number of patients receiving this treatment before Agency assistance.
UGA/6/009	Establishment of in-house Radiopharmacy Services	To establish in-house radiopharmacy services for the production of in-vivo kits for routine nuclear medicine diagnostic studies.	In-house radiopharmacy services established. Equipment upgraded and staff trained. Standard of nuclear medicine services to the public increased and cost of health care reduced.

## East Asia and the Pacific

Project Number	Project Title	Project Objectives	Summary Achievements
CPR/8/010	Using Radiotracers to Determine Residual Oil Saturation	To refine the radiotracer technology and methodology for determining residual oil in oil fields; to apply QA and QC to tracer preparation and validation; to improve and standardize data processing and interpretation; and to validate computer modelling of field parameter evaluation.	National centre established at the Isotope Department of China Institute of Atomic Energy (CIAE). Services provided to field stations in China by centre. Centre serves as a resource for training.
MYA/5/009	Monitoring and Control of Foot-and-Mouth Disease	To develop facilities and techniques for accurate and rapid diagnosis of foot-and-mouth disease (FMD); to conduct a national disease survey and effectively monitor FMD control programmes; and to assist in the production of FMD vaccine for effective control of the disease.	Capability to monitor and control FMD developed at the Livestock Breeding and Veterinary Department of the Ministry of Livestock Breeding and Fisheries. Local capabilities to manufacture FMD vaccines enhanced.
RAS/8/075	Geothermal Energy Resources and Environmental Management	To promote the use and facilitate technology transfer of isotope and geochemical techniques in the exploration, development and management of geothermal resources for electrical and non-electrical applications in the region.	Geothermal exploration and development activities using isotope and geochemical techniques established in the region. Regional co-operation between the core group of trainees established.
SRL/5/030	Mutation Breeding in Bananas and Plantains	To increase production of bananas and plantains by in-vitro mutation breeding to obtain new cultivars.	Capability for mass propagation of banana and for breeding of new banana cultivars with desired traits through induced mutations strengthened.
SRL/7/004	Nuclear Techniques for Improvement of Nutrition and Diagnosis	To evaluate the effectiveness of a national iron fortification programme by using radioimmunoassay (RIA) and related techniques to reduce iron deficiency anaemia; to establish an RIA laboratory in the southern province of Sri Lanka for diagnosis.	National iron fortification programme evaluated using RIA technique. RIA laboratory upgraded at the University of Ruhuna.
VIE/9/007	Infrastructure for Treatment and Management of Radwaste	To formulate the national policy and legal framework and to establish a technical infrastructure for radioactive waste management.	Ordinance on radiation safety promulgated and legal framework to be implemented. Inventory of spent major sources completed and progress achieved in the fabrication of waste packages using an in-drum cementation unit.

## Europe

Project Number	Project Title	Project Objectives	Summary Achievements
ARM/9/002	Seismic Safety Re-Evaluation of Armenian Nuclear Power Plant	To elaborate the regulatory requirements for the seismic re-evaluation of Unit 2 of the Armenian NPP; to upgrade the programme for reviewing the seismic safety of its structures, systems and components; and to improve their seismic safety in accordance with international safety standards.	Technical guidelines for the seismic re-evaluation programme of the Armenian NPP - Unit 2 presented. Accompanying regulatory requirements for the implementation of the programme issued by the Armenian Nuclear Regulatory Authority. New seismic monitoring system installed.
CZR/9/011	Regulatory Assessment of Civil Structures in Nuclear Power Plants	To enhance the capabilities of the Faculty of Civil Engineering of the Czech Technical University, and to support the State Office for Nuclear Safety in the safety assessment of safety related civil structures.	The capabilities of the Faculty of Civil Engineering in providing technical support to the State Office for Nuclear Safety for the assessment of nuclear-related civil construction in Czech NPPs strengthened and used to complete the assessment of the Temelin NPP Safety Analysis Report. Co-operation with the Laboratoire des Ponts et Chaussées in France developed.
LIT/2/002	Assessment of Radionuclide Migration in the Baltic Sea	To create a model for estimating radionuclide migration and self-cleaning processes in the Lithuanian part of the Baltic Sea.	Experimental methodologies harmonized. Data used in pollutant distribution model.
RER/9/050	Harmonization of Regional Nuclear Emergency Preparedness	To provide Member States in Central and Eastern Europe with the means to respond adequately on a harmonized regional basis to severe reactor accidents with a transboundary impact.	Emergency preparedness and response organizations and plans developed in a majority of participating Member States. Communication channels with neighboring countries established and tested.
SLR/4/007	Determination of Weak Spots in WWER-440 Containment System	To develop technologies for leak detection, leakage rate measurement, and identification and repair of leakage in the containment structure of WWER-440 reactors.	Counterpart decreased containment/confinement leakage rate of WWER-440/V-230 and V-213 type NPPs in the region. Conditions of reinforced concrete walls either in terms of on-site practical works performed at NPPs or in terms of studies and development of technological procedures improved.
UKR/9/007	Reduction of Radionuclides in Human Food and Environment	To reduce the internal radiation dose to the population by introducing effective techniques for controlling and reducing radionuclides in food and water.	Facility commissioned to remove radionuclide contamination from dairy products. Five other laboratories established for rapid analysis of Sr-90 and Cs-137 in foodstuffs.

## Latin America

Project Number	Project Title	Project Objectives	Summary Achievements
BRA/4/045	Life Management of Nuclear Reactor Safety Components	To analyze, evaluate, and develop an assessment methodology for nuclear power plant reactor components.	On a routine basis, life evaluation of reactor components performed, providing valuable information to support the authorities in licensing of units I and II of ANGRA Power Station.
BRA/4/047	Fuel Improvement for the IPEN Research Reactor	To develop high-density fuel to improve the efficiency and applicability of the IPEN reactor.	Development of U <sub>3</sub> Si <sub>2</sub> -Al dispersion fuel plate facilitated. Power capacity of the research reactor increased from 2 MW to 5 MW.
COL/8/020	Nuclear Techniques in Coal Mining	To optimize coal mining with a view to obtaining better coal quality, i.e., higher calorific power with minimal mineral and inorganic material content.	National capability in prompt gamma neutron activation analysis technique in routine service to industrial end-users created.
COS/8/007	Sustainable Management of Groundwater in the Central Valley	To evaluate conditions and behavior of the groundwater aquifer in the Central Valley in order to achieve sustainable exploitation and preservation.	Detailed information on the groundwater and pollutant dynamics in the aquifer systems of the Central Valley provided. Water resources can now be protected and preserved.
CUB/2/013	Radioactivity QC for Radiopharmacy and Other Applications	To establish a national facility for radionuclide measurement calibration and standards preparation for applications involving radiopharmaceuticals for diagnosis and therapy, and for other applications using radioactivity measurement.	Counterpart's capabilities for reliable measurement of radioactivity enhanced. Radiopharmaceuticals and RIA kits standardized.
GUA/6/012	Neonatal Hypothyroidism Screening in Rural Areas	To expand neonatal hypothyroidism screening to rural areas using RIA through the establishment of regional centres in public hospitals.	Personnel trained to perform newborn blood specimen testing at hospitals in Mazatanango and Coban, expanding previous coverage. To date, more than 40,000 babies screened.
MEX/6/006	Quality Assurance in Medical X-ray Diagnosis	To establish and maintain a national programme for QA and safety in medical x-ray diagnostics.	Radiation doses to patients needing medical x-rays decreased and controlled. Occupationally exposed personnel benefit also.
NIC/6/005	Refurbishing of Cobalt Source for Teletherapy Unit	To increase the activity of the Co-60 teletherapy unit.	The teletherapy unit's source was refurbished and calibration of the unit verified. Services from the National Radiotherapy Centre improved.
RLA/8/022	Binational Project Bolivia-Peru: Lake Titicaca Water Balance	To obtain basic hydrological information for evaluating the water balance of Lake Titicaca and improving the quantification of water fluxes in the Titicaca basin by means of isotope techniques.	Regular sampling programmes of the lake and rivers established. Estimates of the water balance improved from the information collected.
URU8/012	Vulnerability and Sustainability of the Raigon Aquifer	To establish development plans for sustainable management of the Raigon aquifer.	Technical infrastructure of the State Sanitary Works Institution (OSE) supported with equipment and training. Work continues under a regional project.

## West Asia

Project Number	Project Title	Project Objectives	Summary Achievements
IRA/4/030	Production of Miniature Sealed Sources for Brachytherapy	To extend the range of locally produced sealed sources to miniature sources for application in brachytherapy.	Nuclear Research Centre welding system upgraded. Sealed source production enhanced.
IRA/4/031	Cyclotron Production of Radionuclides for Medical Use	To consolidate and expand the current radionuclide production programme to include F-18 and I-123 based radiopharmaceuticals	Gas target constructed and tested. Production of I-123 commenced.
IRA/8/013	Electron Beam Accelerator for Radiation Processing	To establish a national electron accelerator facility in order to introduce electron beam radiation processing applications and to promote the technology for industrial-scale production of polymer materials and products.	Sterilization of medical disposables, decontamination of pharmaceutical and cosmetic materials, and production of heat-shrinkable tubes and tapes has begun. Facility established strong links with relevant industries.
ISR/1/010	Nuclear Techniques for Monitoring Environmental Pollution	To apply accelerator-based nuclear analytical techniques in the control of air, water and environmental pollution.	Staff trained and dedicated ion source provided. Air pollutants monitored by facility. Data used as input to a national programme for environmental pollution control.
ISR/5/009	Feasibility Study of SIT for Medfly Eradication	To eradicate Mediterranean fruit fly from the Arava Valley within four years using the sterile insect technique as a pilot study for wider application.	Medfly population suppressed in Arava Valley. Co-ordination activities with JOR and PAL succeeded.
JOR/5/007	Feasibility of Area-Wide Control of Medfly by SIT	To initiate feasibility assessments and preparations for implementing a sterile insect technique programme for control of the Mediterranean fruit fly.	Infrastructure for control programme supported. Co-ordination activities with ISR and PAL succeeded. Fruit yields and quality increased.
KAZ/6/003	Screening for Neonatal Hypothyroidism	To establish a screening programme for neonatal hypothyroidism in the Almaty area.	National screening service established. Contacts between Kazakhstan and other Member States with similar programmes established. So far, more than 14,000 neonates screened.
LEB/1/003	Van De Graaff Accelerator for Analytical Applications	To create a multipurpose accelerator facility for analytical applications, research and training.	Model analytical research education facilities for ion beam analysis established. Capabilities of the National Atomic Energy Centre strengthened.
SYR/3/005	Purification of Phosphoric Acid	To upgrade the technical capabilities of Syria in removing uranium from Triple Super Phosphate (TSP) produced at Homs.	A tripartite contract between the Agency, the Government, and equipment supplier signed. Capability of counterpart staff improved. Local availability of purified phosphoric acid for the food industry will save on import costs.
SYR/4/009	Improving Utilization of Miniature Neutron Source Reactor	To minimize outages of a miniature neutron source reactor, establish a training programme in nuclear engineering, and enhance the application of neutron activation analysis for environmental studies.	Capabilities of staff enhanced. Research performed at counterpart facility conforms to international safety and quality standards.

## PART III: RESOURCES AND DELIVERY

### 1. Overview

#### TECHNICAL CO-OPERATION PROGRAMME 2001 (as of 31 December 2001)

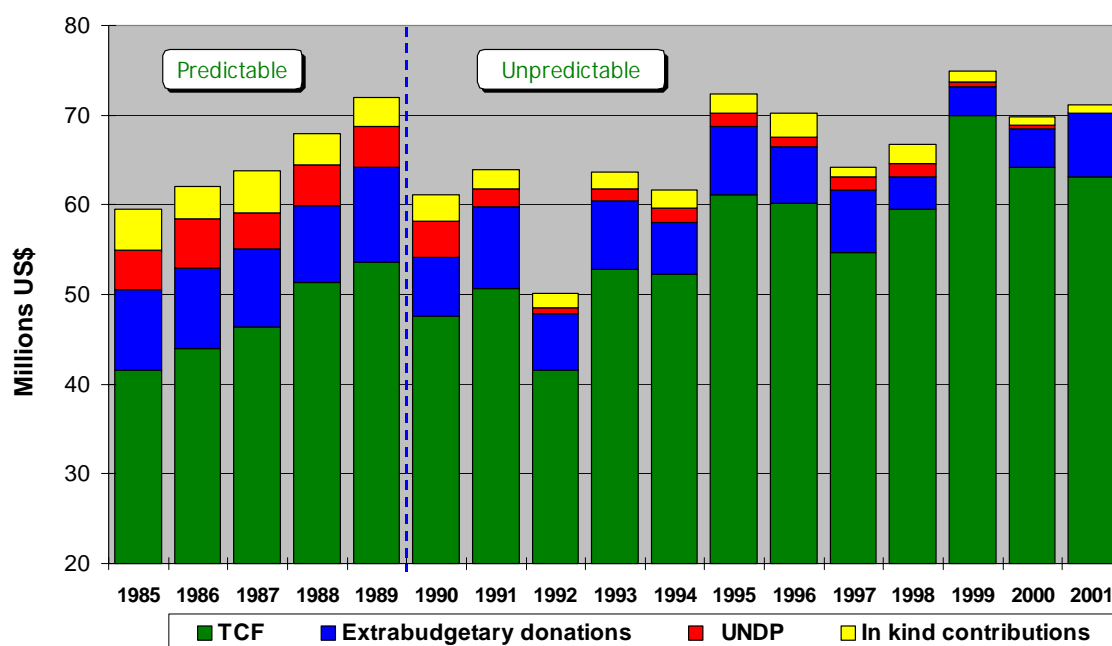
<i>New resources</i>	<b>\$71.1</b>	<i>million</i>
<i>Adjusted programme</i>	<b>\$94.7</b>	<i>million</i>
<i>New obligations</i>	<b>\$71.0</b>	<i>million</i>
<i>Disbursements</i>	<b>\$73.5</b>	<i>million</i>
<i>Implementation rate</i>	<b>75.1%</b>	

149. In financial terms, 2001 was a banner year for the technical co-operation programme. All major indicators showed an improvement over 2000 levels:

- new resources from all sources rose 4.6% from \$68.1 million to \$71.1 million;
- the adjusted programme was the largest ever, standing at \$94.7 million on 31 December;
- new obligations rose from \$66.0 million in 2000 to \$71.0 million in 2001;
- disbursements were up significantly from \$59.1 million to \$73.5 million, partly as a result of the resolution of problems reported last year in connection with the new accounting system; and
- the unobligated balance decreased by \$2.8 million to \$17.1 million.

150. New resources showed a change in composition. As projected last year, extrabudgetary resources increased substantially, from \$4.1 million in 2000 to \$7.1 million in 2001. The TCF also showed a slight increase, rising 0.8% from \$62.6 million to \$63.1 million. However, when adjusted for inflation, there is a decline in the real value of the TCF income. Figure 1 shows the annual record of TC resources since 1985, adjusted for inflation to 2001 values.

**Figure 1. IAEA TC RESOURCES ADJUSTED FOR INFLATION: 1985 – 2001\***

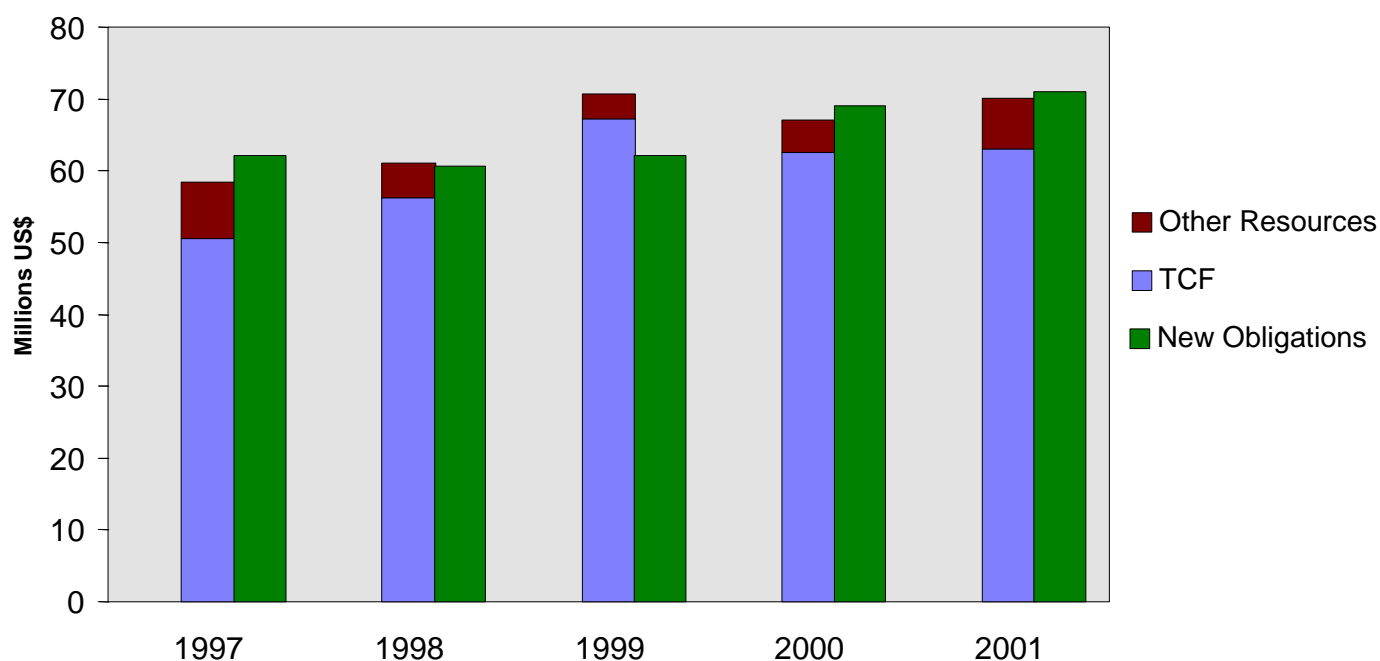


\* All figures prior to 2001 adjusted to 2001 dollars.

151. During 2001, seven new projects were added to the technical co-operation programme with funding from the Programme Reserve, one project was cancelled, and a total of 223 projects were completed. Twelve footnote-a/ projects were made operational during the year and a further 41 projects received additional funds to upgrade components approved under footnote-a/. By year-end, the total programme stood at \$94.7 million.

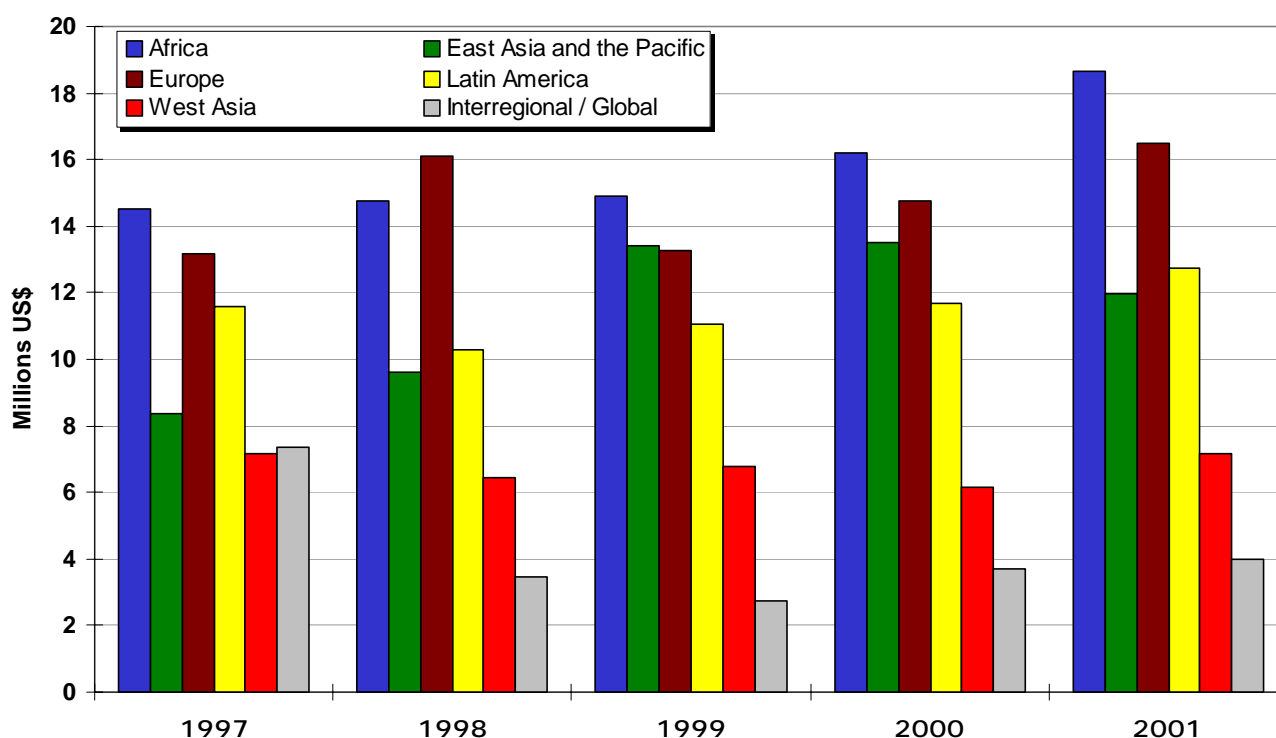
152. New obligations, which measure the implementation of project activities, rose by 7.6% from \$66.0 million in 2000 to \$71.0 million in 2001. Figure 2 provides a comparison of new resources (excluding gifts in-kind) and new obligations over the past five years. In 2001, the value of new obligations was slightly higher than the comparative value of new resources.

**Figure 2. COMPARISON OF NEW RESOURCES WITH NEW OBLIGATIONS: 1997 - 2001**



153. The distribution of the new obligations by region is given in Figure 3.

**Figure 3. NEW OBLIGATIONS BY REGION: 1997 - 2001**



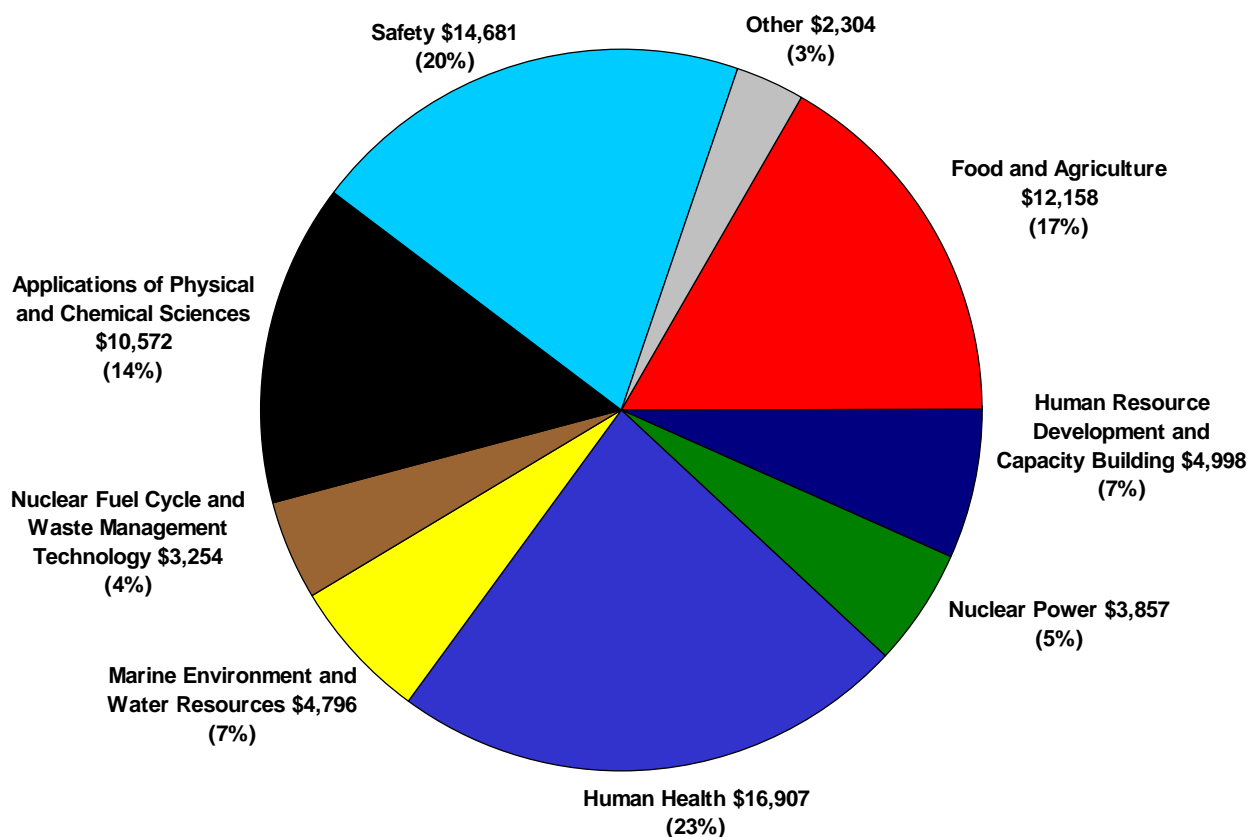
154. As reported last year, disbursements in 2000 were lower than would have been expected, due to problems encountered with the introduction of the new accounting system. These problems were resolved in 2001, resulting in disbursements of \$73.5 million, an increase of more than \$14 million over 2000. However, taking an average over the past five years, the overall level of disbursements is commensurate with the increasing level of new obligations during that period.

155. An analysis of disbursements by Agency Programme can be found in Figure 4. A major reason for the increase in the area of Human Resource Development and Capacity Building (Programme "N") in comparison with 2000 is the \$0.7 million disbursed from the \$1 million approved by the Board to fund additional staff in the Department of Technical Co-operation. Another factor was the large number of pre-project missions and training courses carried out in 2001 to assist Member States in the preparation of project requests for the 2003-2004 technical co-operation programme.

156. While the actual dollar value of disbursements was higher for almost all Programmes due to the high level of expenditures in 2001, a more meaningful comparison can be made based on the percentage represented by each Programme. Safety (including Agency Programmes H, I, and K) continued to represent 20% of disbursements with a value of \$14.7 million. Human Health represents 23% of disbursements, a rise of approximately 2% over 2000. Due to a change in the Agency Programme Codes from 2000 to 2001, disbursements for industrial applications are reflected mostly under Physical and Chemical Sciences in 2001, partially accounting for the rise in that Programme from 10% in 2000 to 14% in 2001.



**Figure 4. DISTRIBUTION BY PROGRAMME: 2001**  
(in thousands of dollars)

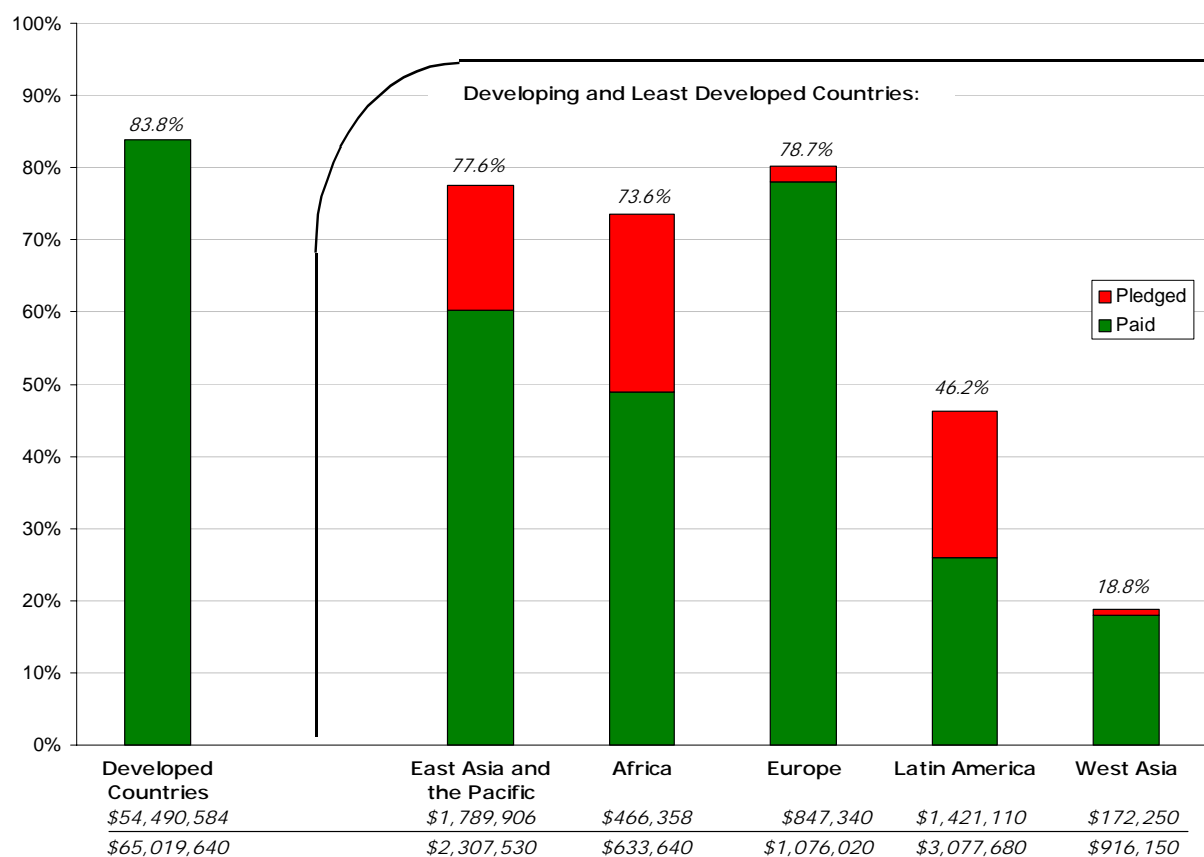


## 2. Technical Co-operation Fund

157. As of 31 December 2001, pledges to the TCF stood at nearly \$59.2 million. Total income to the TCF in 2001, including Member State contributions, payment of assessed programme costs, gain and loss on exchange, and interest income, was just over \$63.1 million, which represented an increase of approximately \$0.5 million or 0.8% over 2000.

158. The pattern of pledges and payments shown below in Figure 5 presents a mixed picture of pledges and payments to the TCF when compared with the status as of 31 December 2000. Developed countries pledged 83.8% of their share of the TCF target, which represents an improvement over 2000. Europe rose significantly from pledging 70% in 2000 to 78.7% in 2001, and Africa also rose slightly to 73.6%. However, East Asia and the Pacific, Latin America, and West Asia all showed lower percentages when compared with 2000. By year-end, Member States achieved a rate of attainment very nearly approaching the 80% target for 2001. It is hoped that Member States from all regions will recognize their responsibility in pledging and paying their full share of the TCF for 2002.

**Figure 5. TC PLEDGES AND PAYMENTS: 2001**  
(as of 31 December 2001)



159. Table 1 shows payments to the TCF for 2001, listing the payments made by the 25 Member States contributing the largest amounts. As can be seen, they accounted for 97.4% of all payments made to the fund.

**Table 1. TCF PAYMENTS 2001**  
(as of 31 March 2002)

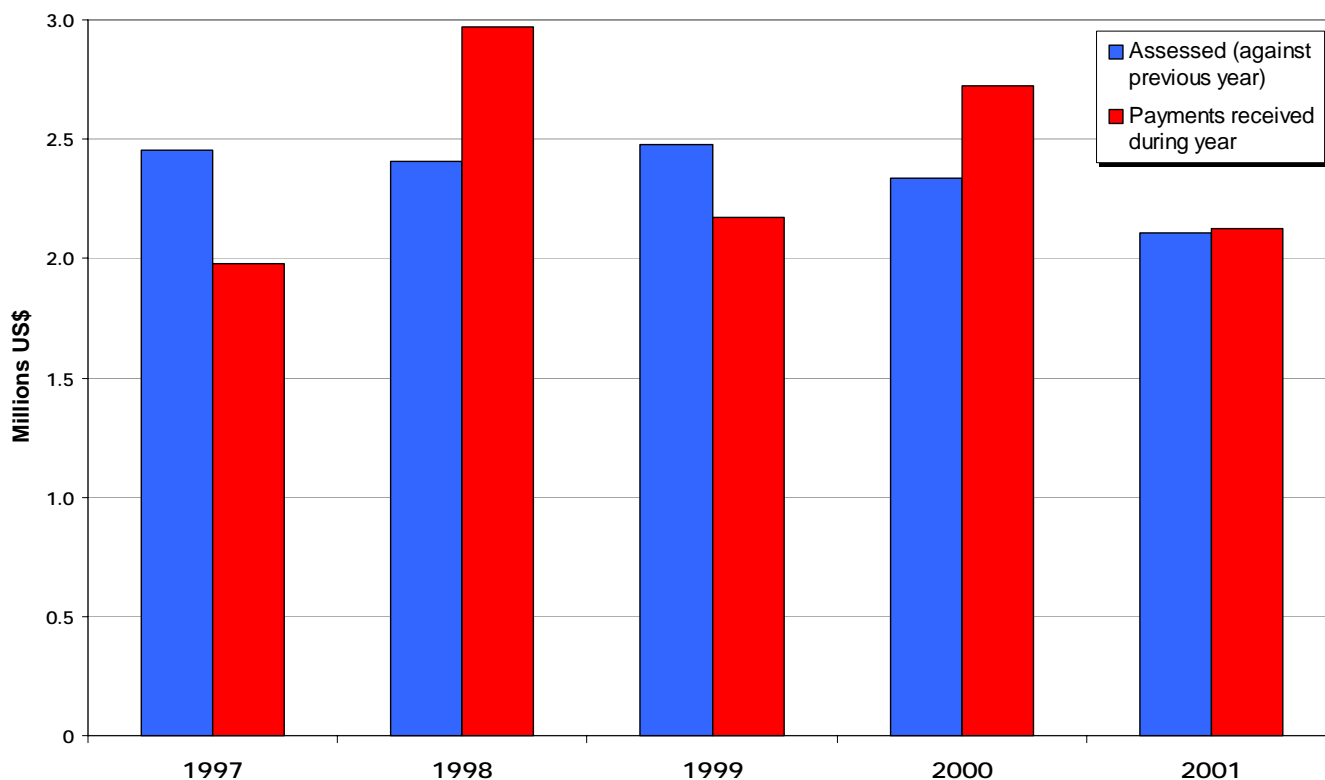
Member State	Payments	Percentage of total payments
United States of America	18,048,775	30.9%
Japan	14,828,490	25.4%
France	4,717,260	8.1%
Germany	4,263,917	7.3%
United Kingdom of Great Britain and Northern Ireland	3,670,440	6.3%
Canada	1,490,446	2.6%
Netherlands	1,176,030	2.0%
Switzerland	876,000	1.5%
Australia	841,530	1.4%
Sweden	777,450	1.3%
Russian Federation	758,110	1.3%
China	716,860	1.2%
Mexico	716,860	1.2%
Austria	678,900	1.2%
Denmark	498,590	0.9%
Norway	439,460	0.8%
Korea, Republic of	400,000	0.7%
Finland	391,280	0.7%
Spain	387,038	0.7%
Turkey	316,820	0.5%
Belgium	250,628	0.4%
India	215,350	0.4%
Ireland	161,330	0.3%
South Africa	153,844	0.3%
Poland	140,890	0.2%
<b>Sub-total</b>	<b>56,916,298</b>	<b>97.4%</b>
Others	1,490,551	2.6%
<b>Total</b>	<b>58,406,849</b>	<b>100.0%</b>

160. An analysis of the new assessment scale, which went into effect 1 January 2002 and which is used to set target shares for voluntary contributions to the TCF, indicates the possibility that resources will be somewhat lower in 2002. Several large, regular donors will be assessed a lower percentage of the total TCF target in 2002, while other Member States, which have not regularly pledged or have paid only a portion of their target share, will be assessed at a higher rate. The Secretariat will monitor the resource picture carefully in the coming year so as to be able to use expected resources effectively while staying within prudent overprogramming levels.

161. Assessed programme costs as authorized by the Board are charged to recipient Member States at a rate of 8% of the technical co-operation programme disbursements for the preceding financial year. The basis for calculating the 8% is the total amount disbursed under national projects and disbursements for fellowships and scientific visits awarded to nationals of that country under regional projects.

162. Figure 6 shows that for the second year in a row, income from APCs during 2001 exceeded the amount assessed in 2001 (against disbursements made in 2000). Total funds received in 2001 amounted to \$2,125,664; a total of \$2,106,761 was assessed in 2001. The total amount of arrears of APCs owed by recipient countries at the end of the year was \$7,043,628. In response to requests from several Member States that wish to pay their arrears, the Secretariat developed guidelines to assist Member States in paying off large arrears of APCs. The guidelines were drawn up along the same lines as the payment plan approved by the General Conference in 1998 to facilitate payment of arrears in Regular Budget payments. Member States with large arrears in APCs are asked to make a written commitment to pay arrears in equal installments over 5 years<sup>7</sup> while also paying the full assessment made during the current year. Member States that make such commitments and honour them are accorded the Due Account status “New Payer”, and thus will be given favourable consideration while formulating the new technical co-operation programme.

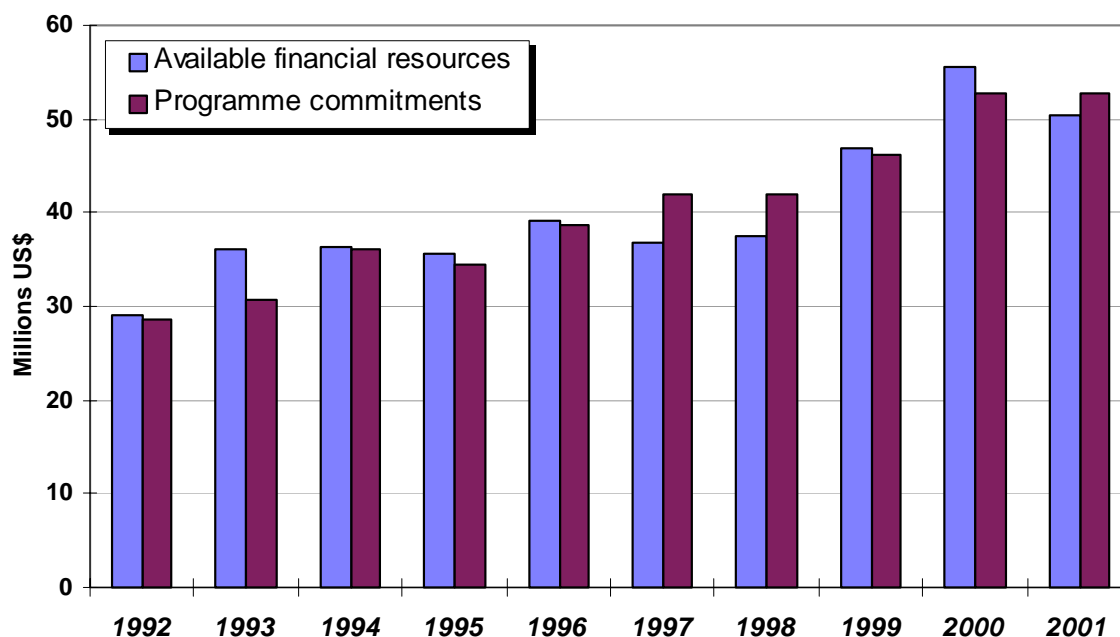
**Figure 6. ASSESSED PROGRAMME COSTS**  
Annual Assessment and Total Payments Received - 1997 to 2001



163. The Agency uses “overprogramming” as a tool to make optimum use of available resources. This means that the total value of the approved programme to be funded from the TCF is greater than the resources available at that time. Experience over the past years has shown that overprogramming levels of approximately 15% during the year can be useful. With project completions and budget adjustments made while finalizing the technical co-operation programme for 2002, the year ended with overprogramming of only 2.6%, which was felt to be prudent based on the requirements of the 2002 programme. Figure 7 shows the amount of overprogramming or underprogramming at year-end for the past ten years. Decisions on adjusting programme size during the year (e.g., by upgrading footnote-a projects) are made more difficult by the unpredictability of TCF resources.

<sup>7</sup> In exceptional cases over a ten-year period.

**Figure 7. TCF RESOURCES AVAILABLE AND PROGRAMME COMMITMENTS IN US\$**  
(as of 31 December 2001)



164. The Secretariat is making efforts to reduce the size of the unobligated balance, which measures the level of TCF resources not used, and which increased sharply in 1999 when an exceptionally large contribution to the TCF was made at the end of the year. By means of overprogramming in combination with a large programme and high implementation, the Secretariat succeeded in reducing the unobligated balance to \$17.1 million, a drop of \$2.8 million from the balance at the end of 2000. Table 2 shows a breakdown of the unobligated balance over the past five years. Although the total unobligated balance decreased in 2001 to \$17.1 million, due largely to the fact that a larger percentage of the pledges had been paid by year-end than at the end of 2000, the usable portion of that balance rose by \$1.0 million. The amount of those currencies which cannot be used, or which can only be used with difficulty, grew by approximately 9% during 2001 and is cause for some concern. The Secretariat will continue to work with the relevant Member States to find ways to use these accumulating currencies.

**Table 2. STRUCTURE OF UNOBLIGATED BALANCE OVER PAST 5 YEARS**

	1997	1998	1999	2000	2001
Unobligated balance all years	9,415,000	10,161,000	18,403,000	19,901,000	<b>17,131,000</b>
Pledges not yet paid	(3,442,000)	(2,400,000)	(2,877,000)	(6,894,000)	<b>(2,704,000)</b>
Non-convertible currencies which cannot be used	(1,770,000)	(1,706,000)	(1,495,000)	(1,631,000)	<b>(1,878,000)</b>
Currencies which are difficult to convert and can only be used slowly	(3,208,000)	(2,611,000)	(2,335,000)	(3,281,000)	<b>(3,468,000)</b>
Resources which can be used for Technical co-operation programme obligations	995,000	3,444,000	11,696,000	8,095,000	<b>9,081,000</b>

### **3. Extrabudgetary Contributions**

165. Extensive discussions with some Member States were successful in attracting substantially higher contributions in 2001 from extrabudgetary donors. Norway provided approximately \$450,000 in 2001 to assist in funding a regional project in Africa, "Sterile Insect Technique for Area-Wide Tsetse and Trypanosomiasis Management". The Swedish Government contributed just under \$70,000 as part of funding for a regional project in Europe, "Physical Protection and Security of Nuclear Materials". Funds will be used for an educational programme in Estonia, Latvia, Lithuania, and Poland to help prevent and combat illicit trafficking in nuclear and other radioactive materials. Switzerland, a first-time donor of extrabudgetary funds, provided \$25,000 to support a training course on depleted uranium in the environment.

166. The negotiations that began last year were completed with the United States Agency for International Development (USAID) to channel some \$2.5 million through the Agency to support projects seeking to control the Mediterranean fruit fly (Medfly) using SIT in Jordan, Israel, and the Territories under the Jurisdiction of the Palestinian Authority. In 2001, the first-year budgets for these projects amounted to \$803,800.

167. Several Member States demonstrated their commitment to projects being implemented in their countries by supplying Government Cost Sharing (GCS) funds. Most notably, \$1,000,000 was received from Syrian Arab Republic for the accelerator being supplied under *Ion Beam Accelerator for Materials Development and Analysis*. Slovakia provided an additional \$302,587 in 2001 to complete the purchase of a cyclotron as part of *Radiochemical Facilities for Producing Medical Radionuclides*; and \$416,000 was received from the Islamic Republic of Iran to assist in the funding of the training approved under *Strengthening Owner's Functions for Bushehr NPP*. Other governments that contributed significant amounts in 2001 include Bulgaria and Egypt.

168. Four UNDP projects were completed, during 2001. One new regional project has been approved for implementation on behalf of UNOPS to develop a strategic action plan for water resources in the Dnieper River in Ukraine, and implementation will begin in 2002.

### **4. In-kind Contributions**

169. The Agency is pleased to give credit to donors for the following types of in-kind contributions: providing experts' and training course lecturers' services fully or partially cost-free in countries other than their own; sponsoring foreign training course participants; providing fellowship training at little or no cost to the Agency (type II fellowships); and donating equipment that is received by another Member State. Member States that would be interested in providing this type of assistance are invited to discuss with the Secretariat how such assistance can best be used in the technical co-operation programme.

170. Sixty-nine countries and eight international organizations provided in-kind assistance in 2001, worth a total value of \$1,039,346. This compares with 39 countries and 7 organizations which provided such assistance in 2000. Most of the 2001 amount (\$786,181) was attributed to the provision of expert services, lecturers, and covering the costs of meeting participants. Full or partial support to fellows and scientific visitors amounted to \$180,555, and the remainder was for support to training course participants (\$61,220) and providing equipment (\$11,390).

## 5. Global Indicators

171. This section reports on the quantifiable inputs supplied and outputs delivered under the technical co-operation programme for 2001. They can be considered as global indicators for assessing the performance of the programme. To complete the picture of global indicators, a financial implementation summary by region and country is given at the end of this section.

172. The aftermath from the events of September 11 caused the cancellation or significant postponement of a number of planned TC activities, particularly in the human resource component of the programme. Seven training courses were cancelled and 12 courses had to be postponed. Due to travel and/or visa restrictions, 24 fellows and scientific visitors were delayed in reaching their place of study and two such studies were cancelled entirely. The assignments of 57 experts or meeting/workshop participants were postponed, with 15 assignments being cancelled altogether. These changes affected virtually all regions. In addition, those activities which were implemented immediately after the events required a considerable amount of extra effort with regard to rescheduling and rerouting of travel in the wake of massive flight cancellations.

### Experts and Meetings/Workshops

173. The total number of assignments fielded in 2001 was 6,860, an increase of 16.8% over 2000. 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). The largest increase (24.5%) was for participation in meetings and workshops, once more confirming the popularity of these fora for information exchange and regional interaction. Table 3 shows the evolution of the expert and meeting/workshop component over the last 5 years.

**Table 3. EXPERTS, LECTURERS AND MEETING/WORKSHOP PARTICIPANTS:  
1997 - 2001**

Year	New obligations \$ million	Persons	Total assignments	Number of assignments				
				International experts	Lecturers	National experts	Meeting/ Workshop participants	Other project personnel
1997	14.2	2,777	4,184	2,122	490	178	1389	5
1998	11.4	2,753	4,111	2,034	506	205	1,363	3
1999	15.4	3,743	5,511	2,365	519	294	2,323	10
2000	17.0	3,848	5,874	2,513	537	433	2,379	12
2001	18.5	4,377	6,860	2,946	476	433	2,962	43

174. One of the objectives of the technical co-operation programme is to promote technical co-operation among developing countries (TCDC). As an indicator of co-operation between countries within the same geographical region, the share of assignments carried out in 2001 by professionals from a given region to another country in the same region was as follows: Africa, 28%; East Asia and the Pacific, 48%; Europe, 84%; Latin America, 57%; and West Asia, 4%.

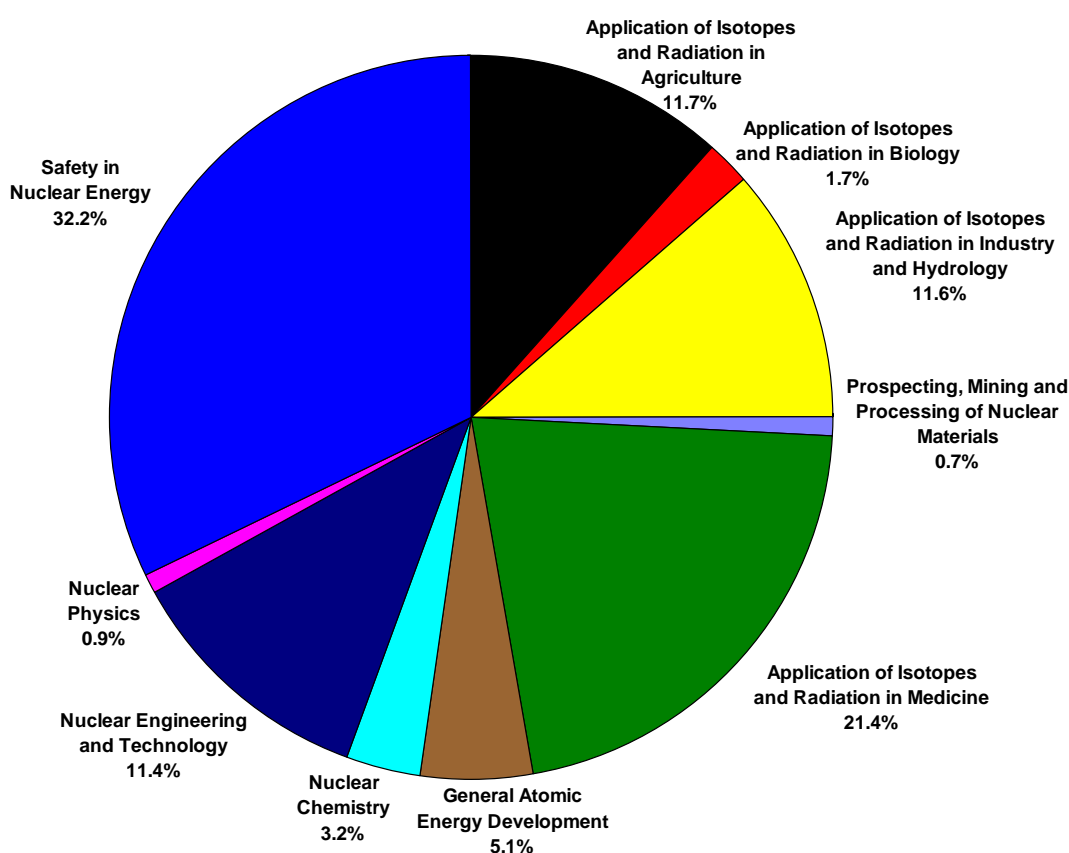
175. Details on the countries/regions which received the assignments and on the origin of the individuals who undertook the assignments are given in Tables C.1 and C.2, respectively, of the Supplement to this report.

### Technical Co-operation Trainees

176. In 2001, 1,516 persons received training as fellows and scientific visitors, and 2,260 through participation in training courses. Details on the countries of origin of the trainees and where they received the training are shown in Table C.3 of the Supplement to this report.

177. Figure 8 below shows that the principal fields of activity in which training was provided were Nuclear Safety with 32% and Medical Applications with 21%.

**Figure 8. TRAINING BY FIELD OF ACTIVITY: 2001**



178. Compared with last year, the number of fellows and scientific visitors went down by 7.4% from 1,637 to 1,516. The number of training course participants remained constant, although the number of training courses decreased from 162 to 146.

179. All of the 146 regional and interregional training courses held in 2001 took place within the framework of TC projects, as had been decided by the Board of Governors. Two of the training courses were planned at the interregional level, and 144 at the regional level. In a few cases, where space permitted and the topic was of particular interest to participants from other regions, trainees from other regions were accommodated in these regional courses. Regional courses included the following events under the Regional Co-operative Agreements: 34 under the RCA, 12 under the ARCAL, and 17 under the AFRA programme. In addition to the 146 interregional and regional training courses, 20 national events were implemented.



180. Table 4 provides a summary of training provided over the last 5 years.

**Table 4. TECHNICAL CO-OPERATION TRAINEES: 1997 - 2001**

Year	Fellowships/Scientific Visits		Training Courses		
	New obligations \$ million	Number of fellows/scientific visitors	New obligations \$ million	Number of courses	Number of participants
1997	8.1	1,223	7.3	122	1,752
1998	9.8	1,335	7.6	160	2,012
1999	9.8	1,381	8.3	162	2,324
2000	10.8	1,637	8.3	162	2,263
2001	9.9	1,516	7.3	146	2,260

181. Forty-six fellows received 111 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 Table 5 below, the estimated value of this cost-free training was \$180,555, which was contributed by four Member States.

**Table 5. IN-KIND SUPPORT FOR FELLOWSHIPS: 2001**

Donor	Number of fellows in the field	Number of months of training	Monetary value (\$)
Singapore	33	75	34,005
Spain	2	6	20,130
United Kingdom	1	3	12,880
United States of America	10	27	113,540
TOTAL	46	111	180,555

### **Women's Participation in the Technical Co-operation Programme**

182. TC particularly encourages women to participate as experts, meeting/workshop participants, fellows, scientific visitors and training course attendees in its programme. In comparison with the base year 1981, when women represented 10.9% of the total participants in all categories, women's participation increased to 20% in 2001. Details on the involvement of women in the technical co-operation programme by human resource category are shown in Table C.4 of the Supplement to this report.

### **Equipment and Supplies**

183. As shown in Table 6, the number of purchase orders in 2001 was 4,433, which was 11.9% higher than in 2000, and disbursements for equipment and supplies increased by \$4.7 million. In 2001, disbursements were \$29.9 million, which represented 40.7% of disbursements for all components under the technical co-operation programme. This

represented the lowest percentage in the past five years, reflecting the Secretariat's commitment to reducing the equipment portion of the programme as recommended by the Board.

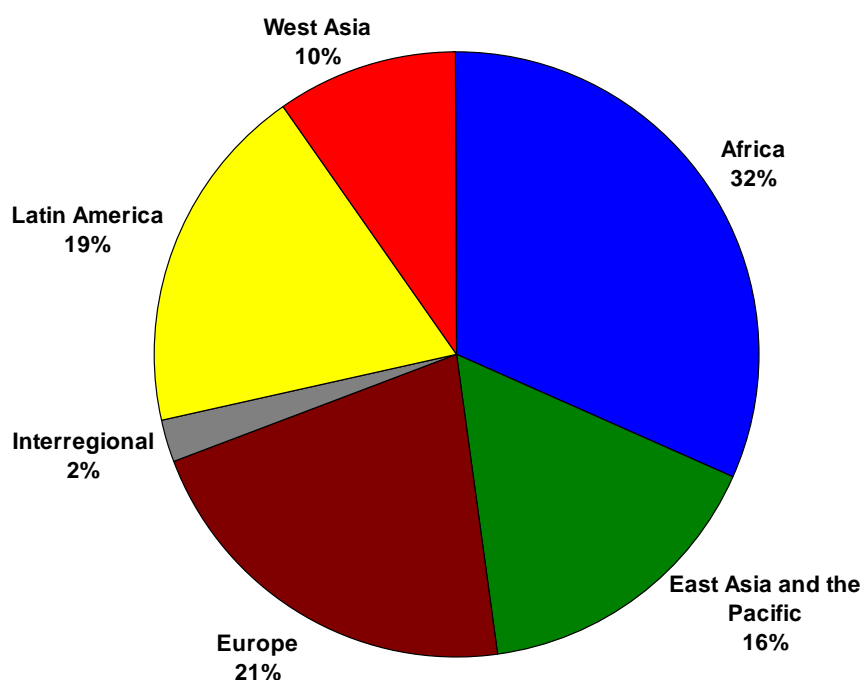
**Table 6. EQUIPMENT AND SUPPLIES: 1997 - 2001**

Year	New obligations \$ million	Disbursements \$ million	Number of purchase orders *
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
2001	33.5	29.9	4,433

\* including training course equipment and research contract orders

184. The largest regional share in disbursements for equipment in 2001 was for the Africa programme, representing 32% of the total.

**Figure 9: EQUIPMENT DISBURSEMENTS BY AREA**



185. In line with the relevant UN resolutions, efforts were continued to increase procurement from developing countries. The value of such procurement increased slightly from \$4.2 million in 2000 to \$4.4 million in 2001. The five Member States representing the largest portion of procurement from developing countries were China, the Czech Republic, Guatemala, Hungary, and South Africa.

186. In compliance with recommendations by the Board, the Secretariat introduced tighter controls for the procurement of sealed radioactive sources. Clearance is required by Regional Managers for Radiation Protection and by the Radiation Health and Safety Officer for both stand-alone sources and sources incorporated into equipment.

187. Table C.5 of the Supplement to this report provides details on the procurement of equipment and supplies by geographic region and country of origin, including supplies and small items required for training courses.

## IMPLEMENTATION SUMMARY

(as of 31 December 2001)

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
<b>Africa</b>			
Algeria	791,580.44	509,551.62	282,028.82
Angola	100,358.97	78,558.10	21,800.87
Burkina Faso	141,945.82	109,016.21	32,929.61
Cameroon	459,256.37	418,279.01	40,977.36
Cote d'Ivoire	161,723.76	89,939.34	71,784.42
Democratic Republic of the Congo	472,190.96	445,913.05	26,277.91
Egypt	1,414,818.76	1,113,157.46	301,661.30
Eritrea	643.50	643.50	0.00
Ethiopia	1,053,558.24	744,767.82	308,790.42
Gabon	68,685.85	34,403.59	34,282.26
Ghana	211,801.83	171,655.63	40,146.20
Kenya	297,105.36	253,418.47	43,686.89
Libyan Arab Jamahiriya	446,806.37	309,609.53	137,196.84
Madagascar	205,278.18	171,333.43	33,944.75
Mali	408,879.47	390,684.82	18,194.65
Mauritius	310,392.28	200,078.93	110,313.35
Morocco	536,992.05	329,781.66	207,210.39
Namibia	508,877.17	410,997.91	97,879.26
Niger	317,076.36	206,130.13	110,946.23
Nigeria	522,370.39	469,001.96	53,368.43
Senegal	186,544.50	179,467.87	7,076.63
Sierra Leone	47,014.37	15,239.92	31,774.45
South Africa	433,960.32	291,103.52	142,856.80
Sudan	654,787.63	549,373.75	105,413.88
Tunisia	557,579.43	365,129.52	192,449.91
Uganda	287,806.34	143,920.74	143,885.60
United Republic of Tanzania	1,503,819.18	1,161,591.12	342,228.06
Zambia	245,945.53	172,818.42	73,127.11
Zimbabwe	207,734.91	117,623.13	90,111.78
Regional Africa	11,663,243.77	9,180,810.77	2,482,433.00
<b>Area Total</b>	<b>24,218,778.10</b>	<b>18,634,000.92</b>	<b>5,584,777.18</b>
<b>East Asia and the Pacific</b>			
Bangladesh	743,075.18	531,873.17	211,202.01
China	1,955,561.13	1,234,377.65	721,183.48
Indonesia	785,419.84	554,874.81	230,545.03
Korea, Republic of	459,541.96	234,030.92	225,511.04
Malaysia	615,249.55	425,290.52	189,959.03
Marshall Islands	-1,984.41	-2,053.83	69.42

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
Mongolia	571,498.76	364,235.87	207,262.89
Myanmar	499,520.78	444,484.96	55,035.82
Pakistan	1,402,314.35	844,990.39	557,323.96
Philippines	654,745.35	555,644.90	99,100.45
Singapore	33,880.00	10,759.78	23,120.22
Sri Lanka	714,986.00	455,428.26	259,557.74
Thailand	564,999.09	378,101.20	186,897.89
Viet Nam	1,044,634.99	652,582.34	392,052.65
Regional East Asia and the Pacific	7,953,867.49	5,310,020.13	2,643,847.36
<b>Area Total</b>	<b>17,997,310.04</b>	<b>11,994,641.05</b>	<b>6,002,668.99</b>
<b>Europe</b>			
Albania	364,610.01	291,871.92	72,738.09
Armenia	1,852,090.73	1,635,049.90	217,040.83
Azerbaijan	50,290.00	40,990.71	9,299.29
Belarus	855,009.90	695,122.03	159,887.87
Bosnia and Herzegovina	306,964.60	212,685.12	94,279.48
Bulgaria	1,319,144.97	750,972.57	568,172.40
Croatia	352,047.61	155,503.56	196,544.05
Cyprus	49,799.37	22,281.10	27,518.27
Czech Republic	162,567.28	133,876.43	28,690.85
Estonia	52,238.74	32,879.72	19,359.02
Georgia	617,046.17	579,098.35	37,947.82
Greece	174,682.66	122,139.05	52,543.61
Hungary	129,000.28	87,153.21	41,847.07
Latvia	180,924.40	72,726.22	108,198.18
Lithuania	421,523.07	211,178.01	210,345.06
Malta	301,381.10	259,800.53	41,580.57
Poland	251,911.13	158,299.46	93,611.67
Portugal	113,550.07	102,705.20	10,844.87
Republic of Moldova	126,096.67	59,529.70	66,566.97
Romania	491,317.02	383,635.08	107,681.94
Russian Federation	178,561.57	107,681.28	70,880.29
Slovakia	1,140,624.35	1,068,743.44	71,880.91
Slovenia	194,228.14	127,000.19	67,227.95
The former Yugoslav Republic of Macedonia	130,904.39	79,546.68	51,357.71
Turkey	479,102.51	302,918.25	176,184.26
Ukraine	1,576,171.31	1,144,771.10	431,400.21
Yugoslavia, Federal Republic of	49,000.00	27,195.90	21,804.10
Regional Europe	9,458,196.91	7,601,723.81	1,856,473.10
<b>Area Total</b>	<b>21,378,984.94</b>	<b>16,467,078.50</b>	<b>4,911,906.44</b>

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
<b>Latin America</b>			
Argentina	653,076.35	580,881.17	72,195.18
Bolivia	562,636.50	293,561.70	269,074.80
Brazil	1,655,017.36	1,332,868.89	322,148.47
Chile	623,180.02	559,755.59	63,424.43
Colombia	284,163.11	269,487.19	14,675.92
Costa Rica	229,533.71	189,021.82	40,511.89
Cuba	797,990.71	644,631.99	153,358.72
Dominican Republic	113,901.17	109,592.88	4,308.29
Ecuador	216,904.29	183,769.62	33,134.67
El Salvador	188,651.87	178,804.86	9,847.01
Guatemala	123,787.05	103,836.20	19,950.85
Jamaica	464,891.38	369,534.71	95,356.67
Mexico	555,679.58	441,353.25	114,326.33
Nicaragua	42,900.65	37,650.99	5,249.66
Panama	207,845.32	176,444.48	31,400.84
Paraguay	-8,191.96	-9,636.00	1,444.04
Peru	580,589.67	444,994.92	135,594.75
Uruguay	800,220.32	687,344.14	112,876.18
Venezuela	441,499.76	401,814.24	39,685.52
Regional Latin America	7,090,361.16	5,750,942.63	1,339,418.53
<b>Area Total</b>	<b>15,624,638.00</b>	<b>12,746,655.25</b>	<b>2,877,982.75</b>
<b>West Asia</b>			
Iran, Islamic Republic of	1,574,679.90	1,293,812.91	280,866.99
Iraq	209,843.28	-22,406.79	232,250.07
Israel	586,088.76	387,806.12	198,282.64
Jordan	614,740.10	388,137.01	226,603.09
Kazakhstan	687,331.77	427,808.98	259,522.79
Kuwait	76,510.00	33,026.49	43,483.51
Lebanon	127,503.68	88,176.11	39,327.57
Saudi Arabia	165,204.13	130,807.87	34,396.26
Syrian Arab Republic	1,767,675.54	1,331,165.31	436,510.23
Territories under the Jurisdiction of the Palestinian Authority	448,246.65	125,817.51	322,429.14
United Arab Emirates	59,708.69	7,979.55	51,729.14
Uzbekistan	540,741.55	342,081.26	198,660.29
Yemen	616,614.93	486,154.70	130,460.23
Regional West Asia	2,539,392.42	2,139,003.83	400,388.59
<b>Area Total</b>	<b>10,014,281.39</b>	<b>7,159,370.85</b>	<b>2,854,910.54</b>
Global	2,170,865.27	1,602,823.11	568,042.16
Interregional	3,319,545.79	2,396,118.77	923,427.02
<b>Overall Total</b>	<b>94,724,403.54</b>	<b>71,000,688.46</b>	<b>23,723,715.08</b>

## ABBREVIATIONS and ACRONYMS

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<b>ADB</b>	Asian Development Bank
<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>ANO</b>	Arkansas Nuclear One (USA)
<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>CEE</b>	Central and Eastern Europe
<b>CEEC</b>	Central and Eastern European Countries
<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>CIS</b>	Commonwealth of Independent States
<b>CNEN</b>	Comissão Nacional de Energia Nuclear - National Nuclear Energy Commission (Brazil)
<b>CNESTEN</b>	Centre National de l'Energie, des Sciences et des Techniques Nucléaires - National Centre for Nuclear Energy, Sciences, and Technology (Morocco)
<b>CNP</b>	Community nutrition project

<b>CNR</b>	Centro Nacional de Radioterapia - National Radiotherapy Centre (Nicaragua)
<b>CPF</b>	Country Programme Framework
<b>CT</b>	Computer tomography
<b>CZM</b>	Coastal Zone Management
<b>DBEP</b>	Dnieper Basin Environmental Programme
<b>DNA</b>	Deoxyribonucleic acid
<b>DOE</b>	Department of Energy (USA)
<b>DU</b>	Depleted uranium
<b>EB</b>	Electron beam
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>EC</b>	European Commission
<b>EDF</b>	Electricité de France
<b>EEC</b>	European Economic Commission
<b>EEPCO</b>	Ethiopian Electric Power Corporation
<b>EGWRAP</b>	Ethiopian Groundwater Resource Assessment Programme
<b>EIA</b>	Enzyme-immunoassay
<b>ELISA</b>	Enzyme-linked immunosorbent assay
<b>EMS</b>	Environmental monitoring system
<b>ENPEP</b>	Energy and Power Evaluation Program (software)
<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>GMP</b>	Good manufacturing practice
<b>GSE</b>	Geological Survey of Ethiopia
<b>HIPC</b>	Heavily indebted poor country
<b>IAEA</b>	International Atomic Energy Agency
<b>IBAR</b>	Inter-African Bureau for Animal Resources
<b>ICCC</b>	Costa Rican Institute Against Cancer
<b>ICRAF</b>	International Centre for Research in Agroforestry
<b>ICT</b>	Information and communication technology
<b>IDRC</b>	International Development Research Centre (Canada)
<b>IEC</b>	International Electrotechnical Commission
<b>ILMB</b>	International Laboratory for Molecular Biology for Tropical Disease Agents



<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>INPO</b>	Institute of Nuclear Power Operations (USA)
<b>IPR-IFRA</b>	Institut Polytechnique Rural de Formation et de Recherche Appliquée (Mali)
<b>IPSART</b>	International Probabilistic Safety Assessment Review Team
<b>IRMA</b>	Immunoradiometric assay
<b>IRRT</b>	International Regulatory Review Team
<b>ISL</b>	In-situ leaching
<b>ISO</b>	International Organization for Standardization
<b>ISOE</b>	International Society of Occupational Exposure
<b>ISRA</b>	Institut Sénégalais de Recherches Agricoles - Senegal Agricultural Research Institute
<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>KAEC</b>	Atomic Energy Committee of Kazakhstan
<b>KAERI</b>	Korean Atomic Energy Research Institute (Korea, Republic of)
<b>KANUPP</b>	Karachi Nuclear Power Plant (Pakistan)
<b>KPM</b>	Karnaphuli Paper Mills (Bangladesh)
<b>LDC</b>	Least developed country
<b>MTBF</b>	Department of Management, Division of Budget and Finance
<b>MTF</b>	Musculo-skeletal Transplant Foundation
<b>MINT</b>	Malaysian Institute of Nuclear Technology Research (Malaysia)
<b>NCCLS</b>	National Committee for Clinical Laboratory Standards
<b>NCS</b>	Nucleonic control system
<b>NDT</b>	Non-destructive testing
<b>NEA</b>	Nuclear Energy Agency (OECD)
<b>NGO</b>	Non-governmental organization
<b>NISIR</b>	National Institute for Scientific and Industrial Research (Zambia)
<b>NLO</b>	National Liaison Officer
<b>NPIC</b>	Nuclear Power Institute of China
<b>NPP</b>	Nuclear power plant
<b>NRC</b>	Nuclear Regulatory Commission (USA)
<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>OSART</b>	Operational Safety Review Team
<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>PGTC</b>	Post Graduate Training Courses
<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>PWR</b>	Pressurized water reactor
<b>QA</b>	Quality assurance
<b>QC</b>	Quality control
<b>QNPC</b>	Qinshan Nuclear Power Corporation (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>RDC</b>	Regional Designated Centres (other terms used in different regions to refer to the same concept include "Centres of Excellence", "Regional Resource Centre [RRC]" and "Regional Resource Units [RRU]").
<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", "Regional Designated Centres [RDC]" and "Regional Resource Units [RRU]").
<b>RRU</b>	Regional Resource Unit (other terms used in different regions to refer to the same concept include "Centres of Excellence", "Regional Designated Centres [RDC]" and "Regional Resource Centre [RRC]").
<b>RTD</b>	Residence time distribution
<b>RT-PCR</b>	Reverse transcription and polymerase chain reaction
<b>SAARC</b>	South Asian Association for Regional Co-operation
<b>SAGTAC</b>	Standing Advisory Group on Technical Assistance and Co-operation
<b>SAR</b>	Safety Analysis Report
<b>SAT</b>	Systematic approach to training
<b>SIT</b>	Sterile insect technique
<b>SON</b>	National Oncological System (Costa Rica)
<b>SPECT</b>	Single photon emission computed tomography
<b>SRC</b>	Schonland Research Centre (South Africa)
<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>TCF</b>	Technical Co-operation Fund (IAEA)
<b>TC-PRIDE</b>	TC Project Information Dissemination Environment (software)
<b>TDA</b>	Transboundary diagnostic analysis
<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>UN</b>	United Nations
<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>UNEP</b>	United Nations Environment Programme
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>UNOPS</b>	United Nations Office for Project Services
<b>UNU</b>	United Nations University
<b>USAID</b>	United States Agency for International Development
<b>WANO</b>	World Association of Nuclear Operators
<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.

**Central Criterion** - A project meets the central criterion if it addresses an area of real need in which there is a national programme enjoying strong government commitment and support. Such projects take two forms: (a) those that produce a tangible socio-economic benefit in an area in which nuclear technology holds a comparative advantage; and (b) those that clearly support an enabling environment for the use of nuclear technologies (such as safety infrastructures or energy planning).

**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 technical co-operation 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.

**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** - The model project concept was an instrument of the Technical Co-operation strategy adopted in 1997. It successfully achieved its objective of raising the quality of project design. The concept has been superseded during the 2001-2002 biennium by the central criterion, which is defined above.

**National Expert** - TC expert who works for a project in his/her own country.

**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.

**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 Regular 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 technical co-operation programme obligations.

**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.