

# **TECHNICAL CO-OPERATION REPORT FOR 2002**

REPORT BY THE DIRECTOR GENERAL

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INTERNATIONAL ATOMIC ENERGY AGENCY

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**INTERNATIONAL ATOMIC ENERGY AGENCY**

# **PREFACE**

**The Board of Governors has requested the transmission to the General Conference of the attached Technical Co-operation Report for 2002, the draft of which was considered by the Board at its June 2003 session.**

**The Director General is also hereby reporting in fulfilment of the request contained in resolution GC(46)/RES/10 on “Strengthening of the Agency’s technical co-operation activities.”**

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## Executive Summary

General Conference resolution GC(46)/RES/10 reiterated the need to strengthen the technical co-operation programme and requested the Director General to report to the Board of Governors periodically and to the General Conference at its forty-seventh (2003) session on the implementation of resolution GC(46)/RES/10. Part A of this report responds to the General Conference resolution by providing an overview of the progress achieved in technical co-operation policies, strategies, working relations, and internal management during the period 1 April 2002 to 31 March 2003, as well as the major new challenges facing the technical co-operation programme. Part B reports on operational activities and programme performance at the country and regional levels during the calendar year 2002, and Part C reviews the use of financial and human resources in the programme at an aggregate level.

As part of its efforts to refine policies for improving programme development, the Agency reviewed the Technical Co-operation Strategy in 2002. The resulting document, *The Technical Co-operation Strategy: the 2002 Review* (document GOV/INF/2002/8/Mod.1), states that the strategic goal originally identified in the Strategy in 1997 remains valid, and defines four objectives to guide the technical co-operation programme: applying the central criterion (strong government commitment), developing strategic partnerships, increasing the level of funding for technical co-operation, and promoting greater sustainability and self-reliance of nuclear institutions.

In line with the Technical Co-operation Strategy, one of the key features of the Agency's work in 2002 was continuing consultations with Member States at both the policy and operational levels on the management of the ongoing technical co-operation programme and on planning for future activities. The dialogue with Member States aimed at clarifying the strategic objectives and key tools for the utilization of resources to achieve maximum developmental impact. The development of Country Programme Frameworks (CPFs) progressed further in 2002, with new CPFs concluded or at an advanced stage of preparation for 29 more Member States. Thematic plans were prepared for food irradiation, river basin management and the role of isotopic techniques in the control of communicable diseases.

The Agency increased its involvement in international efforts to promote development through intensified consultation and collaboration with the United Nations system, multilateral banks, regional organizations and other relevant bodies. As part of its activities to develop strategic partnerships, the Agency signed Memoranda of Understanding with the Common Fund for Commodities, the Transplant Procurement Management Project (University of Barcelona), the National Atomic Energy Agency of Argentina and the University of Buenos Aires. A new form of partnership was entered with the Nuclear Threat Initiative to support the decommissioning of a research reactor in Serbia and Montenegro. In addition, contacts were strengthened between the Agency and regional development organizations to ensure that policies for development programmes complement each other.

During 2002, achievements were made in many areas of implementation of the technical co-operation programme. Training events, expert missions and equipment procurement supported national and regional efforts to initiate or improve cancer therapy facilities. Different government nutrition supplementation programmes benefited from Agency expertise to verify they had the impact expected. In the area of water resource management, an ongoing regional project brought together more than 30 water institutes to solve water shortage problems. And in several regions, plans to construct mass-rearing facilities for medfly and tsetse were a testament that national and regional authorities are committed to the sterile insect technique for the control of insect pests.

In response to resolution GC(46)/RES/10 and to requests from Member States, the use of regional expertise is being expanded as a way to promote technical co-operation among developing countries. Member States are increasingly sharing their experience in building capacity to use nuclear techniques, and regional rosters of experts are being compiled to facilitate their participation in national and regional projects. In order to make a better use of the capabilities of Member State institutions, the Agency has initiated the work to develop well-defined policies and procedures for national execution of technical co-operation activities in national and regional projects.

In response to a request from the Standing Advisory Group on Technical Assistance and Co-operation (SAGTAC) to look at new programme approval options, the Secretariat analyzed relevant stages of the entire programme cycle. The assessment identified a number of possible areas for action, and the information will be submitted to SAGTAC (July 2003) as background material when it reconsiders the subject of programme approval options.

Technical co-operation programme implementation, measured in financial terms, increased to an all-time high of \$74.6 million, well above the record level attained in 2001. This is an indication of the continued importance of the technical co-operation programme to Member States. However, new resources received for the programme were down to \$67.7 million, the lowest level since 1998. It will be increasingly difficult to deliver the entire programme, which is based on extensive upstream work, realistic workplans and careful budgeting, if the resources for funding it are not assured and predictable. In addition, the international political situation made it more difficult to deliver the programme during the past year, and it will be necessary for all Member States to support the Secretariat in its efforts to implement the approved programme in the coming year.

## **A. Strengthening Technical Co-operation**

### **A.1. Refining the Technical Co-operation Strategy**

1. The Agency intensified efforts to refine policies for improving programme development and benefits for Member States. The Technical Co-operation Strategy was carefully reviewed in light of the key lessons learned since it was launched in 1997.

2. The Technical Co-operation Strategy aims at a clear objective: “to increasingly promote tangible socio-economic impact by contributing directly in a cost-effective manner to the achievement of the major sustainable development priorities of each country.” *The Technical Co-operation Strategy: the 2002 Review* (document GOV/INF/2002/8) was prepared for the June 2002 Board of Governors, and the Secretariat received comments from both the Standing Advisory Group on Technical Assistance and Co-operation (SAGTAC) and from different groups of Member States. These comments were included in the modified document (GOV/INF/2002/8/Mod.1), which reiterated that the strategic goals identified remain valid and are an effective framework for further progress.

3. Strong government commitment to project objectives, referred to as the central criterion, is one of the key issues assessed in the 2002 Review. If a government supports a national programme to solve a development problem, then it is one that the government considers to be a national priority. And, if a government partners with the Agency to contribute to solving that problem by applying a nuclear technique, this is a good indication that the nuclear technique has a comparative advantage, or is crucial to the solution of the problem.

4. The technical co-operation programme aims at achieving and sustaining maximum development impact by using the central criterion, but its application to projects is not mechanical. In finalizing the technical co-operation programme for 2003–2004, the Agency gave full consideration to government ownership as a key success indicator for Agency-supported development programmes.

### **A.2. Key Tools for Working with Member States**

5. The development of Country Programme Frameworks (CPFs) remained a high priority, as did activities to prepare thematic plans for areas where nuclear technology can contribute to national development. Indeed, thematic plans were increasingly used in developing CPFs.

6. As a direct result of the CPF process, Agency staff have gained improved access to government officials from mainstream ministries. Governments, as well as other international development agencies, are more fully aware of the wide spectrum of nuclear technologies that are available for key development needs. More than 85% of the countries that have national technical co-operation programmes have implemented or planned CPFs, and nearly 50% of them have formally approved their CPFs.

7. The growing number of completed CPFs is important, but so is the quality and reliability of the process. Special efforts were made to ensure high quality by including technical experts in the country missions carried out in the lead-up to the drafting of the CPFs. Most countries appointed a national CPF co-ordination officer, who was instrumental in involving appropriate authorities and ensuring that the CPF truly reflects national development priorities.

8. During the reporting period, thematic plans were prepared for food irradiation, river basin management and the role of isotopic techniques in the control of communicable diseases. The Agency has been helping Member States with food irradiation for several decades; but river basin management and control of communicable diseases are relatively new thematic areas. A meeting on the role of isotopic techniques in support of river basin management laid the foundation for a long-term programme that could place the Agency in a leadership role in developing the tools needed for integrated and co-operative management for large-scale water resources. In controlling communicable diseases, the Agency is now well placed to provide a basic technology package of nuclear and related molecular biology techniques to multi-tasked reference centres that could be adapted for the diagnosis and treatment of viral (HIV/AIDS, hepatitis, dengue), bacterial (tuberculosis, helicobacter pylori) and parasitic (malaria, sleeping sickness, Chagas') diseases.

9. In order to further strengthen co-operation with Member States, Agency staff carried out 95 country review missions and 165 pre-project missions to recipient countries during the upstream work for the 2003–2004 technical co-operation programme. In addition, staff members conducted regional meetings with all five regional groups to discuss the national and regional programmes. The final discussions of the technical co-operation programme were held during the General Conference in September. Each country had an opportunity to discuss its programme with the Secretariat, and final adjustments were made to ensure full agreement on Member State priorities.

10. Drawing parallels with the physical protection and nuclear security programmes in Europe, where the Technical Co-operation Fund (TCF) and extrabudgetary funds have been combined for the maximum benefit of the recipients, a similar approach was followed for the 2003–2004 cycle within the scope of the Nuclear Security Action Plan and the requests received from Member States for assistance through the technical co-operation programme. Where relevant, specific footnote a/ or mixed funding (TCF and extrabudgetary) projects were formulated for those Member States that had specifically requested such assistance. Such projects will be partly or wholly financed through the Nuclear Security Fund.

### **A.3. Building Partnerships**

11. The General Conference requested continued consultation with the United Nations system, multilateral banks, regional development bodies and other relevant bodies to ensure the optimization of complementary activities. Indeed, the creation of partnerships with other development organizations is crucial to the success of the technical co-operation programme. Synergy with other organizations helps the programme develop a more global reach and have a greater national impact through bringing additional expertise and resources to tackle key development problems.

12. During 2002, such collaboration continued to grow. In the area of food and nutrition, for instance, partnerships were operational with the United States Agency for International Development, the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the Asian Development Bank, the Consultative Group on International Agricultural Research, the United Nations Children's Fund (UNICEF) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). In the area of human health, the Agency was working directly with the Japan International Cooperation Agency, the OPEC Fund for International Development, the Joint United Nations Programme on HIV/AIDS (UNAIDS), and WHO. In the area of water resources management, the Agency was forging close-working ties with the World Bank, the Intergovernmental Oceanographic Commission and regional river basin commissions.

13. Seeking to expand such partnerships, the Agency participated in the United Nations Economic Commission for Africa's (UNECA's) regional consultations of agencies working in Africa, which were devoted to the New Partnership for Africa's Development (NEPAD). UNECA and other agencies were briefed about the Agency's potential contribution to NEPAD through the technical co-operation programme, particularly in the areas of water resource development, food and agriculture, and human health. The participation of the Agency will help in the development of strategic partnerships and increase the constituency for technology transfer programmes in Africa in connection with UNECA's co-ordinated agenda to support NEPAD and the United Nations Millennium Development Goals.

14. A new form of partnership has taken shape through extrabudgetary contributions to the technical co-operation programme by non-governmental organizations. The Nuclear Threat Initiative (NTI) has donated \$500 000 for two technical co-operation projects dealing with the research reactor at the Vinča Institute of Nuclear Sciences, Serbia and Montenegro, as part of a \$5 million pledge for decommissioning the reactor. The first part of the grant will support two footnote a/ projects related to spent nuclear fuel stabilization, decommissioning of the research reactor and waste management at the Institute.

15. A Memorandum of Understanding (MOU) was signed between the Agency and the Common Fund for Commodities (CFC) in 2002. The CFC's mandate is to enhance the socio-economic development of commodity producers. In line with its market-oriented approach, the CFC concentrates on commodity development projects financed from its resources. Working with the Agency, joint initiatives will enhance opportunities for development projects in least-developed and developing Member States.

16. Collaboration with the Musculoskeletal Transplant Foundation (MTF) and the National University of Singapore in the field of tissue banking was described in last year's report. Training through the MTF began, and the University is establishing an international training centre for tissue bank operators. Extending these endeavours, an MOU was signed between the Agency, the National Atomic Energy Commission of Argentina and the University of Buenos Aires to establish a regional training centre for tissue bank operators, managers, and medical doctors from the Latin America region. A fourth MOU was signed between the Agency and Transplant Procurement Management (TPM Project), University of Barcelona, designed to promote joint training courses for transplant co-ordinators and expert missions to improve the work in the participating tissue banks. Seven transplant co-ordinators participated in the first training course jointly organized by TPM Project and the Agency.

#### **A.4. Building Sustainable Institutions**

17. The General Conference in resolution GC(46)/RES/10 requested the Director General to promote within the framework of the technical co-operation programme activities to support self-reliance and sustainability of partner national nuclear institutions and other entities in Member States, and encourage further regional and interregional co-operation. One key goal of the Technical Co-operation Strategy is helping institutes to achieve self-reliance in using nuclear techniques and to have strategies and action plans for revenue generation on a sustainable basis.

18. In pursuit of this objective, participating institutions in an East Asia and the Pacific regional project agreed to establish business development units in which a small core of professional staff with management skills will be developed to manage client relationships and projects. These units will act as a two-way bridge between the research and development capabilities of the research institution and the potential end-users, clients and funding agencies. The functions of business development units were elaborated during a regional workshop in China, organized with the Beijing Institute of Nuclear Engineering (BINE), China. An expert meeting in Thailand produced a guideline for project costing and pricing, to be used by business development units to calculate prices of their products and services.

19. Seeking to establish a broader market for its services, the Tsetse and Trypanosomosis Research Institute (TTRI) of the United Republic of Tanzania concluded a landmark contract with the Agency in 2002 to build up and maintain tsetse colonies on behalf of other African Member States. This is an important step in the Agency's support of the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) and enhancing regional self-reliance and sustainability in tsetse mass-rearing.

#### **A.5. Promoting Technical Co-operation for Development**

20. The General Conference in resolution GC(46)/RES/10 requested the Secretariat to continue working with Member States, within regional groups, in identifying regional resource centres and in developing and refining outsourcing mechanisms to enhance technical co-operation among developing countries (TCDC). 'Outsourcing' has been viewed as a way of enhancing TCDC, by involving institutions in developing countries in the implementation of technical co-operation activities. However, as pointed out in the recent review by the Joint Inspection Unit (document JIU/REP/2002/7), the term 'outsourcing' should be restricted to refer to contractual relations with commercial vendors for non-core support activities and services. Operational activities for development should be referred to more appropriately as 'national execution' or 'national capacity building'. In order to promote TCDC, the Agency will develop well-defined policies and procedures to provide for national execution of technical co-operation activities for national and regional projects. This will permit a better use of the capabilities of Member State institutions and support their further development.

21. In East Asia and the Pacific, seven Member States have shared experiences in building capacity to use nuclear techniques to assess the effectiveness of nutritional supplementation. As a result, the counterpart staff have gained valuable experience in

monitoring methodologies as well as experience on best practices for successful nutritional interventions among vulnerable groups.

22. Investigations carried out in Indonesia using stable isotopes to measure the effectiveness of fortified wheat flour are being used by China and Pakistan in performing studies to advise their policy makers on formulating better nutrition policies. A similar project in China succeeded in determining the appropriate levels of iron uptake in anaemic children who were given iron-fortified fish sauce. In a joint meeting of the five regions, Latin America was identified as leading the application of isotopes in evaluating nutrition intervention programmes. Latin America's research has also led to a re-assessment of global recommendations for nutrition.

23. The use of regional expertise in Latin America is expanding rapidly. A roster of experts from the region was compiled to establish the technical expertise available in the region and facilitate their participation in national and regional projects. This activity was implemented in close collaboration with the Agency's technical divisions.

24. The Co-operative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology (ARASIA) entered into force in July 2002. The first meeting was attended by the representatives of Jordan, Lebanon, Syrian Arab Republic, United Arab Emirates, and Yemen as well as by other interested countries in the region. ARASIA aims to promote and co-ordinate co-operative activities for training, research, development and applications of nuclear science and technology and to implement these activities through their competent national institutions. The 2003–2004 technical co-operation programme includes two regional projects for the countries that are members of ARASIA.

## **A.6. Strengthening Programme Management**

25. In 2001, SAGTAC asked the Secretariat to look at new programme approval options that could reduce inefficiencies by adopting a more programmatic approach. An assessment exercise concluded, however, that the approval process could not be considered in isolation. To be really meaningful, it was necessary to look at all related aspects of the programming cycle. Therefore, relevant stages of the entire programme cycle were analyzed through interviews with internal and external stakeholders, research (documents and reports) and discussions with the Office of Internal Oversight Services (OIOS), which had recently completed an evaluation of the technical co-operation planning process. The assessment identified a number of possible areas for action, which are being followed up by the Agency. Information from these endeavours will be submitted to SAGTAC (in July 2003) as background material when it reconsiders the subject of programme approval options.

26. As a follow-up to the assessment of the programme approval process, the Agency organized a retreat in February 2003 to provide an opportunity for country officers to exchange experience amongst themselves, with technical co-operation senior management and with staff of other Departments. Retreat working groups discussed four key topics: Country Programme Framework and Upstream Work; Project Design, Appraisal and Work Planning; Project Implementation; and Project Monitoring, Self-evaluation, Feedback and Follow-up. The participants identified challenges and successes in these areas and shared experiences between regional and departmental representatives. The working groups also

identified possible solutions to constraints and proposed action plans for immediate and medium-term implementation.

27. As a further follow-up to the approval process assessment, the TC Project Request Form was revised by a working group with the goal of making it simpler while ensuring that it contains the essential information for adequate appraisal.

28. As part of efforts to provide better service to Member States through the improvement of internal processes, an intranet system has been developed for technical officers and technical co-operation staff to prepare an electronic request for procurement. The system has query tools to search for vendors and similar purchase orders. The system supports electronic approvals, guides the preparation process and validates the data quality of the requests. Users of the new system have responded positively.

## **A.7. Financial Support for the Programme**

29. The General Conference in resolution GC(46)/RES/10 requested Member States to pledge and pay their respective shares of the TCF targets in a timely manner, and to pay their assessed programme costs (APCs), requesting those Member States which are in arrears to meet this obligation. Full and assured funding of the TCF was again a topic of considerable discussion during the year. After extensive consultations, the General Conference approved an increase of the TCF target for 2003 and 2004 to a value of \$74 750 000 for each year. Nevertheless, the level of actual resources received against the established targets remains a matter of concern.

30. Although the rate of attainment set for 2002 was 85% (resolution GC(44)/RES/8), pledges to the fund stood at less than 80% in March 2003, with actual payments (on which the rate of attainment calculation is based) amounting to only 79% of the \$73 million target for 2002. The uncertainty of funding was again made clear when one major donor substantially reduced its pledge for 2002 at the end of the year. Following two years in which the APC arrears had been reduced, there was a net rise in the APC arrears in 2002, as payments received fell short of the amount assessed. Taken together with losses on exchange, the TCF's new resources for 2002 stand at \$67.7 million, their lowest nominal level since 1998 (\$63.0 million).

## **A.8. Communication and Outreach**

31. *Science Serving People*, a new brochure and website launched in September 2002, tells the story of how the Agency is helping to harness scientific knowledge to promote development and deliver real benefits to people in the developing world. It demonstrates how nuclear science and technology are being employed to overcome the challenges of water scarcity, food insecurity, malnutrition, malaria, environmental degradation and many other serious problems. More than 2000 copies of the brochure were distributed in 2002, and French and Spanish editions were published early in 2003.

32. Further improvements were made to the Department of Technical Co-operation's two web sites: the publicly available TC web site, [www-tc.iaea.org](http://www-tc.iaea.org), and Technical Co-

operation Project Information Dissemination Environment—TC-PRIDE, a restricted site available to Agency staff and registered users from Member States, [www-tc.iaea.org/tcpride](http://www-tc.iaea.org/tcpride). Of note, the number of new registered users for TC-PRIDE amounted to 509 for 2002.

33. One of the improvements made to the TC web site was the addition of a new site describing the Agency's thematic plans. This site is an outreach mechanism to Member States and other partners that will strengthen awareness about some of the Agency's non-power applications and how they are being used to improve people's lives, particularly in developing countries.

## **A.9. Key Lessons from Evaluation**

34. Three technical co-operation programme evaluations were conducted in 2002: a comprehensive evaluation of the programme planning process; an evaluation of technical co-operation projects on land remediation in Central and Eastern Europe; and an evaluation of projects on crop improvement for food and agriculture, which was carried out jointly with the FAO evaluation service.

35. The evaluation of the technical co-operation programme planning process concluded that in planning the programmes for the past three cycles, progress had been made towards fulfilling the objective of the Technical Co-operation Strategy adopted in 1997, namely, orientation towards the end-user and a focus on results linked to socio-economic development, and that this orientation is being applied by the majority of Member States. The evaluation noted further that development and implementation of the new planning process is still in transition towards full institutionalization and that continued efforts would be needed in this area. An action plan to follow-up on evaluation recommendations was prepared by the Department of Technical Co-operation in consultation with OIOS. The follow-up includes: training in the use of planning tools such as the programme and project framework matrix; reinforcing the CPF process; enhancing the role of the technical officers in upstream work; strengthening the role of National Liaison Officers (NLOs); promoting greater coherence between thematic planning and the CPF process; and creating stronger links with other United Nations strategic planning exercises, such as the Common Country Assessments, the United Nations Development Assistance Frameworks and World Bank Poverty Reduction Strategy Papers.

36. Another evaluation reviewed the activities supported by the Agency for the remediation of the land contaminated in Central and Eastern Europe as a consequence of the Chernobyl accident. It concluded that the projects undertaken were consistent with the priorities of the affected countries, they responded to pressing needs of the population and governmental authorities and were on track to achieve the main objectives and planned outcomes. The evaluation found that improved collaboration with other international development partners would further enhance the outcomes.

37. The objective of the evaluation of projects on crop improvement for food and agriculture was to identify ways in which technical co-operation projects could result in sustainable production of food and export crops. The evaluation revealed that no data are currently being collected on the extent to which research results are applied; and even if information exists on increased yields and improved productivity, it is difficult to attribute these changes to the project. The key lesson learned from this evaluation is that the Agency

will have to exchange experience with other United Nations organizations, development banks and other relevant institutions on the results of plant breeding programmes to assess their impact.

38. Another lesson gained from recent evaluations is that, despite the considerable progress made over the last two years, work planning, performance assessment and communication among all concerned stakeholders needs to be further improved. This recommendation will be implemented during the coming years by setting milestones for projects to ensure continuous performance assessment throughout the project cycle. Linking workplans to milestones and performance indicators of project outcomes will help to better relate the implementation of projects to the expected end results. Further improvements to communications will be made through information technology solutions combined with training initiatives.

## **A.10. Addressing New Challenges**

39. A major challenge for the Agency is to be accepted as an important partner in development. In addition to nuclear safety, the Agency's technical co-operation programme focuses largely on key areas of sustainable development — water, energy, health and agriculture. In developing countries, these areas receive special attention from the governments and from donors; however, it is quite difficult for the Agency to be appreciated as an important contributor. In line with the Technical Co-operation Strategy, which advocates alignment of the Agency's assistance to national priorities, the approach has to be to contribute to larger programmes, thus leveraging our financial resources to achieve greater impact. An obstacle to be addressed in this regard is the negative public opinion of nuclear technology — it is considered unsafe by some, irrelevant or inappropriate by others. Many government authorities and organizations active in international environment and development issues share these views. Well-directed efforts need to be made to raise awareness and change the minds of our potential partners and of the public.

40. To make the most effective use of the available resources for assisting Member States, the Agency has endeavoured to place emphasis on a limited number of fields of application, such as insect pest control, water resource management, nuclear medicine, communicable diseases and nutrition without neglecting the other areas where Member States request technical assistance. The challenge facing the Agency now is to establish a reliable basis for determining which technologies to continue to promote and which new ones to support in addressing the countries' needs and priorities. This requires an objective assessment of the benefits and costs of these technologies and their impact, including environmental and socio-economic aspects.

41. A corollary of this task is mobilizing greater resources for the technical co-operation programme. The challenge of meeting the Member States' priority needs grows as the number of countries receiving technical co-operation support increases and some areas acquire greater importance. Moreover, the unwillingness or inability of many countries to meet fully their TCF target shares has resulted in a drop in net new resources in 2002. More efforts will have to be undertaken by Member States to ensure sufficient financing for the technical co-operation programme. In addition, new sources of financing must be sought. The challenge of slow growth in financial resources from traditional donors was recognized

in the Technical Co-operation Strategy, which established an ambitious objective of a 25% increase in extrabudgetary resources by 2007 (based on 2002 data). Achieving this objective will require a new approach to the process of formulating the footnote-a/ programme through the creation of 'bankable projects', i.e. projects specifically designed to attract extrabudgetary donor funding, and the development of closer contacts with existing and new partners.

42. Another challenge to be faced is overcoming the increasing difficulties in the transportation of sealed sources, radioactive material, and toxic or hazardous chemicals. A large number of airlines, sea carriers, airports, marine ports, etc., refuse to accept potentially hazardous materials, or if they do, a high surcharge is applied. Examples include irradiators for sterilization in mass rearing of tsetse flies, cobalt-60 sources for cancer therapy, and dose calibrators with a small built-in calibration source. This obstacle is causing significant delays in implementing many technical co-operation projects and also has a negative impact on the sustainability of projects that have already been implemented. These issues have been debated by the Transport Safety Standards Committee and possible solutions to the problems will be a subject of discussion at the International Conference on the Safety of Transport of Radioactive Material to be held in Vienna in July 2003.

## **B. Technical Co-operation Major Achievements**

### **B.1. Africa**

43. Extensive dialogue was conducted with Member States in 2002 at the policy and operational levels in relation to the management of the ongoing programme and of future planning. Thus, the programme management staff undertook more than 30 missions to Member States, and visits to Vienna were arranged for National Liaison Officers from 12 countries. This latter modality was very efficient in fostering active participation of National Liaison Officers in technical co-operation planning and programming, and project management.

44. Continuing interest has been demonstrated by African Member States in the use of the Country Programme Framework (CPF) modality to achieve focused programming. This planning tool has been extensively used in the majority of African Member States for the preparation of the 2003–2004 technical co-operation programme. Two CPFs were signed (**Senegal** and **Tunisia**) in 2002 and three final draft documents were submitted for endorsement by governmental authorities (**Libyan Arab Jamahiriya**, **Madagascar** and **Uganda**). Furthermore, the CPF process was initiated in six other countries.

45. The national programme and regional participation of **Uganda** illustrates how a CPF has been used as a planning tool. The near-term core programme relating to agriculture will focus on creating a tsetse-free zone in the Lake Victoria basin and improving crop productivity. For crop improvement, the programme will address the problem of low and declining soil fertility and crop productivity through an integrated nutrient management approach. Isotope hydrology will be used in a number of areas. These include the continued assessment of groundwater recharge and distribution of groundwater resources, protection of water resources in the south-western townships, and sustainable development and equitable utilization of the common Nile basin water resources. In the energy sector, isotope techniques will continue to be used in the assessment of the viability of geothermal resources for energy production. The near-term core programme for human health will include continued support for the consolidation of the nuclear medicine and radiotherapy services at Mulago Hospital. The use of stable isotopes to assess the efficacy of nutrition intervention programmes for HIV/AIDS sufferers will be introduced.

46. Promoting regional co-operation and technical co-operation among developing countries (TCDC) remains a key feature of the technical co-operation programme in Africa. At the end of 2002, there were seven regional resource centres designated by the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) in the areas of non-destructive testing, mutation breeding, radiation oncology, radioactive waste management, and maintenance of scientific equipment. Under the AFRA programme, a regional workshop was organized for the heads of national nuclear institutions to acquaint them with modern concepts and tools for designing, planning and delivering services to end-users, including business plans for promotional activities.

47. Developing partnerships with relevant multilateral organizations and financial institutions is important to strengthen the programme. A grant amounting to \$200 000 was

approved by the OPEC Fund for International Development in 2002 to support the AFRA project 'Management of Most Common Cancers in Africa'. The Agency was also involved in discussions between the Government of **Burkina Faso** and the OPEC Fund for International Development regarding the funding of a large regional tsetse mass-rearing facility.

### **B.1.1 Water Resource Management**

48. Rational water resource management is essential in a region of pronounced water scarcity. Substantial assistance over the past years in terms of building the infrastructure and expertise to implement national isotope hydrology programmes helped the majority of African Member States.

49. Under regional project RAF/8/034, 'Isotope Hydrology Integration in the Water Sector', the Agency has been assisting 29 African Member States to develop the isotope hydrology expertise required for water resources management and to establish a regional capability to provide training in isotope hydrology techniques and related fields. Two regional training courses were held in **Morocco** (in French) and **Uganda** (in English). More than 50 participants have acquired basic knowledge of and experience in the use of isotope hydrology techniques for the assessment of groundwater resources. In addition, 11 participants have learned how to interpret the available isotopic data in order to extract the most useful information by attending an advanced regional training course organized by the Agency at Argonne National Laboratory, USA.

50. In **Ethiopia**, the results of project ETH/8/006, 'Isotope Techniques for Water Resource Management', were useful in assessing the groundwater potential of the Akaki aquifer, near Addis Ababa. The local and regional groundwater regimes have been estimated and their interaction and interconnection is now understood. The recharge area of the well field has been delineated and the groundwater flow direction and velocity have been ascertained. An understanding of the vulnerability of the resource has also been achieved, which should pave the way for the judicious and sustainable exploitation of this resource. Through this project, isotope hydrology has become a standard tool for the country. A national workshop supported by the Agency brought together a number of stakeholders to discuss the country's future strategy for water resource development. Extrabudgetary funding was provided by the USA. Staff are now working in four target areas with Agency support under project ETH/8/007, 'Groundwater and Geothermal Resource Exploration in the Ethiopian Rift Valley and Adjacent Areas'.

51. The Government of **Uganda** has embarked upon the 'South-Western Towns Water and Sanitation Project' incorporating the use of isotope hydrology to establish sustainable water development and management. Project UGA/8/004, 'Isotopes in Management of Town Water Supplies in South-Western Uganda', will benefit a number of towns whose water provision is based on groundwater abstracted through deep boreholes, shallow wells or springs. However, there is little information regarding the source, flow path, and quantity of this water to ensure sustainability of these programmes. The Austrian Government is supporting the programme bilaterally. Agency assistance in isotope hydrology has also been provided under project UGA/8/003, 'Isotope Hydrology in Exploring Geothermal Resources'. Funding from the African Development Bank was used in the siting of wells. Three geothermal prospects at Katwe, Buranga and Kibiro were assessed for their energy

potential using nuclear techniques. Results indicate that among the three, the Kibiro geothermal prospect has the highest potential for energy development, with a reservoir temperature of 200°C or higher.

52. In **Niger**, the Agency assisted the Directorate of Hydraulics, the Directorate of Water Resources, and other local water supply institutions in the Zinder region to evaluate the groundwater resources in order to improve the quantity, quality, and sustainability of water in the region. Data from the isotope study were included in a document given to water authorities containing recommendations for the development of a new exploitation zone in the region. Results from the study were also integrated into a major Chinese-funded programme aimed at investigating water resources in a 400 square kilometre area in the Iullemeden basin.

### **Tunisia and Integration of Isotope Hydrology Techniques**

The availability of fresh water resources in **Tunisia** is limited to about 430 cubic metres per capita per year. The need for potable water is particularly critical in the south of the country where rainfall is limited and more than 80% of the groundwater resources are of high salinity. Since 2001, three national projects have been implemented in the area of isotope hydrology. Under project TUN/5/017, 'Nuclear Techniques to Improve Water and Soil Management', the focus was on soil and crop production studies and groundwater investigations using isotope techniques in the plain of Kairouan. The results obtained from the sampling campaign helped to (i) identify preferential infiltration zones in the main channels of the Merguelil and Zeroud waterways; (ii) determine the different hydrodynamic characteristics of the reservoirs in the Merguelil and Zeroud watersheds; (iii) show that the shallow and deeper aquifers are in connection upstream and are totally separated downstream; and (iv) confirm that the presence of dam reservoirs has reduced drastically the infiltration to the aquifer.

The tangible results achieved from the various national projects that were implemented in Tunisia over the past years, together with the growing support and widening constituency regarding the potential of isotope techniques in addressing practical problems, has encouraged national counterparts to consider new opportunities. Examples of this include project TUN/8/014, 'Evaluation of Erosion and Sedimentation in the Medjerda Basin', which established monitoring stations to help develop a model for predicting erosion, transport of solids and sedimentation in drainage basins and to deal with desertification and silt build up in dam structures. In addition, a Programme Reserve project (TUN/8/015) was established in 2001 to assist the national counterparts to assess marine intrusion in the coastal aquifer systems of the Cap Bon region. In the El Haouaria Plain, the isotope investigations helped to clarify the source and areas of recharge to the aquifers, while on the eastern coast, isotope data led to the understanding of the source and origin of recharge. Additional work on the characterization of the salination processes will be continued under a new national project (TUN/8/017) that was approved for the 2003–2004 cycle.

53. In order to build upon the achievements of the regional project RAF/8/029, 'Sustainable Development of Groundwater Resources', the Agency organized in Vienna a technical review workshop and a final project co-ordination meeting in June 2002 that was attended by project counterparts as well as senior decision-makers and planners in the water sector from the seven participating countries (**Kenya, Madagascar, Namibia, South Africa,**

**Uganda, United Republic of Tanzania and Zimbabwe**). The meeting enabled the participants to evaluate technical and management lessons learned from the project. The presence of senior representatives of the end-users gave a unique opportunity to enable policy discussions to further the impact of the follow-up activities on groundwater management practices and to make full use of project results in the broader planning processes in the water sector.

54. In the **United Republic of Tanzania**, nitrate detected in the Makutupora basin well field has raised concerns about safety of the water supply for the city of Dodoma. The project has assessed the potential sources of nitrate in the groundwater and its movement through the aquifer. The results will support groundwater protection and management, and protect investments in wells, pumps, and pipelines.

55. In **Senegal**, the results from project SEN/8/005, 'Management of Water Resources', were directly integrated into the final report of a major water management programme ('Long Term Water Sector Project') financed by the World Bank. The isotope techniques used in the project gave important data for the preparation of the conceptual flow model that was developed within the framework of the World Bank project. Assistance was also provided to **Nigeria** to address the groundwater problems of the Chad basin aquifers with particular focus on the water supply of the city of Maidiguri, capital of Burno State. By applying stable and radioactive isotopes, the flow regime and recharge conditions of the multi-layered aquifer of the Chad formation, and the relationship between the Lake Chad waters and the contiguous aquifer system were understood.

56. The programme for 2003–2004 pertaining to the use of isotope hydrology techniques in the water sector includes more than 20 national and regional projects. Special efforts have been made to plan and formulate new sub-regional initiatives consistent with Member States' approaches to implement programmes related to shared aquifers. These include projects on the sustainable development and equitable use of the (i) common Nile Basin water resources, (ii) the Nubian Sandstone Aquifer, (iii) the Iullemeden Aquifer and (iv) the North-west Sahara Aquifer System.

### **B.1.2 Food and Agriculture**

57. The Agency contributed directly to the implementation of the Pan African Tsetse and Trypanosomosis Eradication Campaign's (PATTEC's) Plan of Action through regional project RAF/5/051, 'Sterile Insect Technique for Area-wide Tsetse and Trypanosomosis Management', and six national projects (**Ethiopia** – ETH/5/012, **Kenya** – KEN/5/022, **Mali** – MLI/5/017, **South Africa** – SAF/5/005, **Uganda** – UGA/5/023, and **United Republic of Tanzania** – URT/5/019). In close collaboration with FAO, a regional training course was held in Ouagadougou, **Burkina Faso**, for West African Member States on geographical information system (GIS), which is a tool for the planning and monitoring of tsetse and trypanosomosis intervention projects and related agricultural development.

58. In **Botswana** during 2001 and 2002, a tsetse fly-infested area of almost 16 000 square kilometres was subjected to state-of-the-art aerial spraying using the sequential aerosol technique (SAT), ensuring only the minimal introduction of non-persistent insecticide to the environment to suppress the fly population before using the sterile insect technique (SIT). Impact on non-target species, monitored throughout the campaign, was found to be negligible. In contrast, the effect on the tsetse population has been devastating.

No flies have been trapped since the campaign. The Government is collaborating with the Agency to prepare for a SIT campaign to mop up any residual flies under project BOT/5/002, 'Support of Tsetse Eradication from Ngamiland'. This project includes developing strategies for detecting and monitoring very low fly population densities. Building on the success achieved in Botswana, the use of SAT for tsetse suppression is being considered by a number of other Member States.

59. In **Ethiopia**, the Government has embarked upon the construction of a mass-rearing facility that will eventually hold 10 million female flies. The first module is nearing completion. Tsetse suppression has already begun in the Southern Rift Valley. A tsetse suppression campaign in the Lambwe Valley, **Kenya**, has been initiated to pave the way for the use of SIT to create a tsetse-free zone. The Agency assisted the Government of **Uganda** to prepare a ten-year plan for the removal of tsetse flies from the Lake Victoria basin. Assistance in the establishment of a colony of *Glossina fuscipes fuscipes*, a tsetse species that transmits both nagana and human sleeping sickness, as well as the development of a tsetse suppression strategy is being provided under project UGA/5/024, 'Integrated Area-Wide Tsetse Eradication Programme in the Lake Victoria Basin'.

60. Large-scale monitoring campaigns on Zanzibar continue to show the absence of both tsetse flies and trypanosomiasis in local livestock, thus indicating the sustainability of the Agency-supported SIT campaign that eradicated tsetse from Zanzibar in 1997.

61. In **South Africa**, under project SAF/5/002, 'Sterile Insect Technique Integrated Management of Fruit Fly (Phase II)', SIT activities have focused on an initial pilot area for Mediterranean fruit fly control in the grape-exporting Hex River Valley. Sterile flies are being released into the target area for the first time since 1999. The impact of the project is (i) a reduction in control costs from \$400 000 per annum with chemical control to \$150 000 per annum with SIT, and (ii) a reduction in fruit fly rejections of export table grape cartons from the Hex River Valley by approximately 50%. This project has also led to interest in the commercialization of SIT in South Africa through the registration of a private company, which is planning a multi-insect sterile insect rearing facility in the Western Cape.

62. The Agency is assisting four West African Sahelian countries (**Burkina Faso, Mali, Niger** and **Senegal**) under regional project RAF/5/048, 'Combating Desertification in the Sahel'. Based on the complete assessment of desertification problems and actions taken in the participating countries, the Agency assistance focused on strengthening national capacities for the application of nuclear techniques in water and nutrient management studies, including the use of nuclear techniques in nitrogen and water dynamics in rainfed arid and semi-arid areas. A partnership has been established with the Tropical Soil Biology and Fertility Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and Consultative Group on International Agricultural Research and linkages were made with the Desert Margins Programme of the United Nations Environment Programme (UNEP)/International Crops Research Institute for the Semi-Arid Tropics.

### B.1.3 Human Health

63. The first project co-ordination meeting (Cape Town, **South Africa**, November 2002) for the tuberculosis (TB) component of project RAF/6/025, 'Detection of Drug Resistant Malaria and Tuberculosis', was held in conjunction with a training workshop on conventional and molecular methods for susceptibility testing of drug-resistant TB. One of the conclusions from the meeting highlighted the importance of national counterparts to work closely with representatives of the World Health Organization (WHO) national TB programmes. Furthermore, in close collaboration with WHO, the performance of rapid techniques to detect drug-resistant TB versus conventional methods will be assessed in a selected Member State through the project in 2003. A programme to establish early diagnostic techniques for haemoglobinopathy with the aim of reducing morbidity and mortality of the most vulnerable groups, particularly children, has been operational in **Niger** since 1999. As a result of the Agency's assistance, molecular and radionuclide techniques for the detection of sickle cell anaemia and thalassaemia-related mutations were established. Scientists' and technologists' skills were also enhanced, thereby making them more competent to deal with the detailed protocols used. Collaboration has also been established between six hospitals and antenatal centres within the country.

64. In **Ethiopia**, as a result of project ETH/7/004, 'Evaluation of Supplementary Infant Feeding Practices', the staff of the Ethiopian Health and Nutrition Research Institute were able to use isotope techniques to measure breast milk intake and infant growth, with a view to acquiring the necessary information to plan and implement nutrition intervention programmes for lactating mothers and their infants. Micronutrient and trace elemental analysis of FAMIX (a fortified cereal mix for infant and children) was undertaken. FAMIX was found to be sufficient to cover infant dietary requirements for most nutrients such as carbohydrates, fat, protein, iron, copper, manganese and iodine, but intake of zinc remains sub-optimal. The results of these studies will be used to improve nutrition intervention programmes.

65. The Ocean Road Cancer Institute (ORCI) is the only cancer therapy facility in the **United Republic of Tanzania**. Under project URT/6/017, 'Improvement of Radiotherapy Facilities', low dose-rate brachytherapy was introduced at ORCI and is now being used to treat cervical cancer patients. The facility has also established in vitro molecular methods for the diagnosis and management of cancer under project URT/6/018, 'Establishment of a Radioimmunoassay Laboratory at the Ocean Road Cancer Institute'. Further support — the installation of a simulator to improve the quality of treatment — has been provided under project URT/6/019. Recognizing the crucial role of ORCI in the fight against cancer in the United Republic of Tanzania, the Government has made \$600 000 available for the further development of the facility. A sizeable portion of these funds is being transferred to the Agency to be used on a cost-sharing basis under project URT/6/020, 'Improvement of Radiotherapy Services (Phase II)', whereby ORCI will be able to double its capacity for treating patients.

66. **Namibia** has been addressing its shortage of nuclear medicine personnel by establishing a tele-link between the Dr. Bernard May Hospital in Windhoek and the Tygerberg Hospital, Cape Town, **South Africa**, through project NAM/6/005, 'Improving Nuclear Medicine Services in Namibia'. The capability to send nuclear medicine images online has overcome the isolation often experienced by Namibian nuclear medicine experts.

The hardware installed has also resulted in enhancing the quality of images for bones and a number of organs including heart, brain and kidneys, allowing for more accurate clinical diagnosis. In addition, clinical study images (principally thyroid, liver, bone and renal) and remote consultations were transmitted through the operation of a permanent Internet link between the University Teaching Hospital, Lusaka, and the Groote Schuur Hospital, Cape Town, within the framework of project RAF/6/023, 'Expanding Nuclear Medicine Services through Tele-linking', involving **South Africa and Zambia**.

67. Agency assistance in the treatment of cancer patients, including equipment and training of medical personnel, is making a difference in Africa. The number of cancer patients treated for curative and palliative purposes has increased by an average 9% in all participating AFRA countries since 2001. In addition, the number of trained radiation oncologists and medical physicists has also increased by 13% as compared with 2001, to culminate in about 85 trainees. Of particular importance is the continuous support being provided by the OPEC Fund for International Development and the International Society for Radiation Oncology to these AFRA projects.

### **Establishment of the First Radiotherapy Facility In Zambia**

The Government of **Zambia** has secured a \$5.6 million loan from the OPEC Fund for International Development to establish the country's first radiotherapy facility. As part of the Agency's initiative to work closely with other development organizations and following several consultations with the National Institute for Scientific and Industrial Research, Agency support will be provided in connection with the implementation of this national radiotherapy programme. The new project, ZAM/6/010, 'Establishment of a Radiotherapy Facility', will assist the Government of Zambia in establishing a central radiotherapy facility in Lusaka to treat the growing number of cancer patients in the country. The OPEC Fund for International Development's loan will be used by the Government to cover the purchase of equipment and some training, and the Agency's primary involvement will be in the provision of training and technical advice through expert services related to the establishment of the facility.

#### **B.1.4 Energy Planning and Development**

68. Through the implementation of project RAF/0/016, 'Sustainable Energy Development in Sub-Saharan Africa', a co-ordination meeting was held in **Sudan**, August 2002, to review project achievements and progress and to plan follow-up activities for 2003–2004. The first training workshop was held in Trieste, Italy, in co-operation with the Abdus Salam International Centre for Theoretical Physics where 32 participants from 12 African Member States (**Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Mali, Mauritius, Namibia, Niger, Nigeria, Sudan, Uganda and United Republic of Tanzania**) and four observers from Brazil were trained in using the Agency's Model for Analysis of Energy Demand (MAED). Participants received training on how to develop projections for energy and electricity demand that are consistent with the socio-economic and technological

development objectives for the country. In addition, expert missions were fielded to Namibia and Sudan to help them analyze essential data needed for the MAED.

### **B.1.5 Industrial Applications**

69. The AFRA Member States have made significant progress towards realizing regional self-reliance in non-destructive testing training under project RAF/8/032, 'Strengthening Regional Training Capability in Non-Destructive Testing (AFRA IV-6)'. A workshop to prepare Member States in the requirements for training, examination and accreditation for Level III in four disciplines was held at the regional designated centre at the Southern African Institute of Welding, paving the way for the first Level III candidates to be trained, examined and accredited on the African continent.

### **B.1.6 Nuclear, Radiation and Waste Safety**

70. The promotion and development of nuclear techniques for socio-economic development requires an adequate radiation safety infrastructure to protect radiation workers, the public at large and the environment. The Agency is working to improve the radiation protection infrastructure in all African Member States including special assistance for the safe conditioning of radiation sources, the establishment of regulatory frameworks and the enforcement of legislation and regulations.

71. Under the regional projects RAF/9/027, 'National Regulatory Control and Occupational Radiation Protection Programmes', and RAF/9/029, 'Development of Technical Capabilities for Sustainable Radiation and Waste Safety', activities continued for the implementation of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (Basic Safety Standards). Three relatively new Member States to the Agency, **Benin, Botswana** and the **Central African Republic**, were invited to participate in project RAF/9/027. In 2002, with **Algeria, South Africa** and **Zambia** joining the project, the number of Member States participating in project RAF/9/029 increased to 13.

72. National training courses on radiation protection and on the security of radiation sources were supported in **Uganda**. The courses were addressed to officers in law enforcement agencies. The following are other major developments concerning project RAF/9/027: (i) enabling legislation was promulgated in **Cameroon, the Democratic Republic of the Congo** and **Mali**; (ii) regulations or decrees, establishing the regulatory authority and governing different aspects of radiation safety and the security of radioactive material, were enacted in the **Democratic Republic of the Congo, Gabon, Madagascar** and **Mali**; (iii) a system for thermoluminescence dosimetry-based individual monitoring for external occupational exposure control was provided to **Angola, Burkina Faso** and **Nigeria**, and upgraded in **Mauritius, Morocco, Namibia, Niger** and **Sudan**.

73. The project RAF/9/028, 'Postgraduate Training in Radiation and Waste Safety', established in 2001, continued to address the Member States' needs for capacity building and qualified specialists in this field. In addition to the fourth postgraduate education course in English, the first university-based postgraduate education course for the French-speaking countries of Africa was organized in the newly established training centre in Rabat, **Morocco**.

74. Upon **Angola's** request for assistance to safely condition the radiation sources available at the national oncology centre, two exploratory missions visited Luanda to identify the radiation sources and design adequate solutions for their conditioning with the competent authorities. The AFRA specialized team identified a cobalt-60 radiation source of about 500 Ci in a Teletron-80 machine and a caesium source in its original transport container. These sources have been dismantled and exported to **South Africa** for conditioning and reuse. This AFRA specialized team has also conditioned radium sources and disused cobalt sources in several other countries in the region.

75. Under the regional project RAF/0/015, 'Legislative Assistance for Safe and Peaceful Uses of Nuclear Energy', the Agency has been assisting African Member States to establish adequate national legal frameworks in order to comply with the fundamental requirements of treaties, conventions, protocols and other relevant international instruments. Two regional workshops organized by the Agency in Austria (in French) and in **Ghana** (in English) were attended by 57 participants from 28 countries. The workshops were useful in providing information to the participants on the legislative and regulatory framework governing the safety of radioactive waste management, including general safety requirements, existing facilities and past practices, siting of proposed facilities, clearance and exemption levels, pre-disposal management and disposal of radioactive waste. The workshops also covered the basic legal and technical aspects of safe transport of radioactive material.

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

76. The technical co-operation programme in East Asia and the Pacific region addresses the regional and national needs of 14 recipient Member States. The nuclear activities in the region cover a wide field involving nuclear power plants, research reactors, irradiation facilities, and cyclotrons. The regional and national programmes have been designed to complement each other, and to avoid duplication. The regional programme specifically addresses issues having trans-boundary effects, and is intended to solve common problems of the region and harmonize approaches, standards and methodologies.

77. The approved technical co-operation programme for 2003–2004 has been the result of rigorous upstream work and based on the needs and requirements of the Member States as identified during the pre-project missions, project planning meetings and in line with the respective CPFs, whether finalized or in-process. During the upstream work, it was stressed to all Member States that according to the present Technical Co-operation Strategy, which calls for a needs driven and sustainable programme focusing on results, the new projects should target certain problems related to sustainable development and have the involvement of all key players, i.e. the government, research institutes and the end-users, such as industry, and other international organizations. As a result of the upstream work, a majority of the approved projects meet the central criterion.

78. CPFs and the CPF process, as planning tools, improved project selection and helped national authorities identify problems to be addressed with nuclear technologies. The Agency assisted Member States that do not have a CPF to begin the process. Five countries (**Indonesia, Malaysia, Mongolia, Philippines** and **Sri Lanka**) in the region have approved CPFs, while drafts have been prepared for **Bangladesh, China, Myanmar, Pakistan** and **Vietnam**.

79. Efforts were also continued to build partnerships with other international development agencies, such as the Asian Development Bank, the Japan International Cooperation Agency and the Forum for Nuclear Cooperation in Asia to collaborate in areas where nuclear technology has definite comparative advantages over conventional technology. In addition, synergy was fostered between the Agency and other organizations such as the United Nations Economic and Social Commission for Asia and the Pacific and Association of South-East Asian Nations to ensure that policies for developmental programmes complement each other.

### **B.2.1 Nuclear, Radiation and Waste Safety**

80. There are five countries in the region with large nuclear power programmes, three of which are recipient Member States (**China, Republic of Korea and Pakistan**). The focus of the programme is to ensure safe, reliable and effective operation of nuclear power plants (NPPs) through the introduction of best international practices to reduce occupational radiation exposure to staff in NPPs, enhance the required managerial competencies related to operational safety of NPPs, improve plant performance, and establish a safety culture.

81. Under the regional project RAS/9/022, 'Improving Occupational Radiation Protection in NPPs', individual as low as reasonably achievable (ALARA) programmes for all three participating NPPs from **China, Republic of Korea and Pakistan** were developed. Two missions visited China and Republic of Korea to evaluate the performance of the ALARA programme of the Qinshan-1 and Ulchin-1 NPPs, respectively. These evaluations and a regional workshop have helped to identify good practices for work management and dose reduction, especially during plant outages. Two types of ALARA training syllabi for radiation protection in NPPs were also developed: one for radiation protection of workers and the other for senior managers including those working in regulatory authorities. The application of the ALARA principle has contributed to achieving a measurable reduction in occupational doses to workers in NPPs of the participating countries. In addition, more extensive job-specific dose information systems are in place. In order to follow-up various activities and to replicate and to disseminate the lessons learned to other NPPs in the participating countries, Phase II of the project has been included in the 2003–2004 cycle.

82. Safety of NPPs is the highest priority in **Pakistan's** technical co-operation programme. Since the establishment of the independent Pakistan Nuclear Regulatory Authority (PNRA) in January 2001, PNRA has produced 12 regulatory documents. Under project PAK/9/023, 'Strengthening of Nuclear Safety Regulatory Authority', assistance was provided for legislation, regulations and guidelines. Through the Agency's activities, PNRA has also developed some bilateral co-operation programmes with other countries, such as Slovakia and Switzerland. The Pakistan Government has made cost-sharing contributions of \$770 000 to the Technical Co-operation Fund for Chashma NPP procurement needs.

83. During 2002, under project RAS/9/023, 'Legislation for Safe and Peaceful Nuclear Applications', significant restructuring of the regulatory infrastructure has been initiated in **Bangladesh, Thailand and Vietnam** with the development of a comprehensive 'overarching atomic or nuclear law' for enhancing the legal arrangements for peaceful uses of nuclear energy. Thailand, especially, is near to completing its restructure, and foresees establishing an independent regulatory authority. In co-ordination with the above-mentioned project, Bangladesh is reviewing its legal framework to create an independent regulatory authority

under project RAS/9/026, 'National Regulatory Control and Occupational Radiation Protection Programmes'. In addition, **Malaysia**, **Pakistan** and the **Philippines** took the necessary steps to bring all previously exempted or unlicensed radiation sources and practices under regulatory control.

84. Also under project RAS/9/026, a peer review mission to assess the effectiveness of the regulatory programme in **Bangladesh**, completed in December 2002, concluded that the country formally meets project milestone 1, and progress has been made towards the implementation of milestone 2. Based on the information gathered by various project monitoring missions, all Member States participating in the projects for radiation protection, except for one, are at varying stages of implementation of milestones 3–5<sup>1</sup> noted under project RAS/9/027, 'Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure'.

85. The Agency's one-year postgraduate education course in radiation protection, organized in co-operation with the **Malaysian** Government, is continuing for the second year with the participation of 12 countries. Two students from each country, with four from the host country, graduated in February 2003. The administrative duties related to the postgraduate education course were outsourced to the Malaysian Institute for Nuclear Technology Research.

86. With the development of nuclear applications in agriculture, health and industry, low and intermediate level radioactive waste is accumulating in many countries, which calls for the application of improved waste management practices. The Agency and the governments of the Member States have attached great importance to waste management and disposal.

87. **Bangladesh** has made progress through project BGD/4/022 to complete its centralized radioactive waste processing and storage facility. Civil construction is almost completed, taking into account Agency recommendations. The facility is expected to start operation in the spring of 2004.

88. In February 2000, a sealed radioactive source was involved in an accident in **Thailand** that resulted in three deaths. The high activity source, which was from a teletherapy machine used to treat cancer patients, had an activity of over 400 Ci. Following its initial recovery from the accident site, local authorities had no proper shielding or transport container to store the source safely. As an immediate alternative, the source was placed into a storage pool for spent fuel rods from a research reactor. While the source was managed adequately in the storage pool, these conditions were not ideal for the long term. Agency experts devised a workplan to recover the source from the storage pool. The source was recovered, conditioned and rendered safe in September 2002.

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<sup>1</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.

## B.2.2 Food and Agriculture

89. Agriculture is the economic backbone for all recipient countries in the region. Food security remains a problem in many countries as well. The agriculture projects addressed basic needs of a growing population: food supply, food security and food trade.

90. In **Indonesia**, it is difficult to grow wheat at the high elevations and in the harsh climate of the agricultural area. Counterparts turned to the Agency to assist them in using nuclear techniques for induced mutation of sorghum to replace fields of poorly producing wheat. Under project INS/5/030, 'Sustainable Agriculture Development in Yogyakarta', drought-tolerant sorghum mutants were developed and adapted well to the severe conditions of water stress existing during the dry season in the Gunungkidul area. The end result will be the reduction of the country's dependence on wheat imports.

91. High quality rice is a major export of **Vietnam**. Nuclear analytical techniques, such as gamma-ray spectrometry and X-ray fluorescence, are used to monitor radioisotopes and heavy metals in rice exported from Vietnam. Project VIE/2/006 was undertaken to upgrade and strengthen the capacity of the Institute for Nuclear Science and Technique (INST), Hanoi, to carry out nuclear radiation measurements, in order to ensure accurate and timely analysis of rice and other food items for export. As a result of the project, the analytical capability of the INST has been enhanced for monitoring environmental samples, rice and other food items, meeting the international requirements for export. More than 300 food samples were analyzed in 2002. The project was partly supported by the United States of America.

92. Through project MAL/5/025, 'Food Safety Monitoring Programme for Livestock Products', a livestock product safety monitoring programme has been prepared and is being implemented in **Malaysia**. Routine testing using nuclear techniques to detect residues in food has been provided to various end-users, such as farms, quarantine stations, food processing plants and slaughterhouses. The counterpart laboratory has established a quality assurance programme and has been officially accredited by the Department of Standards. The monitoring programme for the safety of livestock products has been submitted to the European Commission for acceptance to promote international trade.

93. The Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) project RAS/5/039, 'Restoration of Soil Fertility and Sustenance of Agricultural Productivity', has two components. Under component 1 on integrated nutrient, crop, and water management practices for increased crop yields, results obtained so far showed promising trends. For example, by including grain legumes to rice-based cropping systems and by using an associative nitrogen fixation bacterium, farmers used 20% less inorganic fertilizers. In rice-wheat cropping systems, sowing of wheat after rice could be advanced by 12 days through use of a zero till drill. Component 2, which started in 2002 and will be implemented through 2004, addresses issues related to soil and water degradation by soil erosion and agrochemical contamination. An assessment was made of the Member State capacities for implementing the project, in particular the application of the caesium-137 technique, and guidelines on the type of studies and scale of work were provided. **Thailand** was identified as a regional resource unit (RRU) for nitrogen-15 analysis of samples; **China** for training and analytical services for caesium-137 measurements; **Vietnam** was proposed as an RRU for analytical and quality assurance

services for caesium-137 measurements; and Australia for providing training and expert assistance on application of caesium-137 in soil erosion and sedimentation studies.

94. Twelve participating countries consolidated their ability to sustain the use of radioimmunoassay, through local production of standards and quality controls in national laboratories under RCA project RAS/5/035, 'Improving Animal Productivity and Reproductive Efficiency'. The production and supply of iodine-125 labelled progesterone tracer is now done in a regional laboratory in **Thailand**. During 2002, following previously reported successes on nutritional supplementation strategies using urea molasses multinutrient blocks, the project focused on internal parasites. To mitigate the effects of the parasites, the participating Member States worked to use medicated blocks for control of parasites and simultaneously to supplement low-quality feeds. Almost 100% efficacy using the medicated block with fenbendazole has been confirmed by five participating countries (**Bangladesh, India, Malaysia, Thailand and Vietnam**). A number of potential herbal anthelmintics (pineapple leaf, neem leaf, momordica and commercial mixtures) have been identified, and efficacy on the order of 75%–95% when used as a single dose has been demonstrated in six participating countries (**Bangladesh, China, India, Indonesia, Myanmar and Vietnam**).

95. The above-mentioned project has identified more than 40 new feed resources, which do not compete with human food. The majority of them are also capable of growing in poor and degraded soils in the region. The feed resources are now being investigated for suitability on pilot farms and those selected will be recommended for wider dissemination. A total of approximately 10 000 man-days of training were organized for farmers and extension workers, and around 50% of the trained farmers are using the new technologies.

96. Work to eradicate rinderpest disease, which affects livestock, has been orchestrated by the Global Rinderpest Eradication Programme from FAO in Rome. Livestock of **Pakistani** farmers suffered from this disease, and it was a major obstacle to development for the country. Through the efforts of FAO, the Agency, and other donors, the disease has been eradicated, according to an official announcement by the International Office of Epizootics. This was achievable due to the fact that Pakistani officials openly acknowledged the presence of the disease, and due to major efforts to change the field reporting systems so that disease surveillance could be maintained. The Agency assisted this by transferring technology to study samples from cattle and buffalo for antibodies against rinderpest, as well as molecular techniques using radioactive isotopes (polymerase chain reaction).

### **B.2.3 Human Health**

97. The countries of the region face challenges both in communicable and non-communicable diseases. The projects in this field are aimed at building capacity to use nuclear techniques for diagnosis and therapy.

98. In view of the increasing demand for cyclotron produced short-lived radioisotopes and radiopharmaceuticals, as well as for positron emission tomography applications to perform improved diagnostic studies for patients suffering from heart disease or cancer, the Agency assisted the Korea Cancer Centre Hospital (KCCH) with the purchase and installation of a 30-MeV cyclotron dedicated to radioisotope production (project ROK/4/030). The Agency also helped KCCH in their national programme for the design and

production of a 1-MeV and a 13-MeV cyclotron dedicated to positron emission tomography (PET) and single photon emission computed tomography applications.

99. Congenital hypothyroidism (CHT) is an uncommon but clearly identifiable and preventable cause of mental retardation. The Agency has been actively involved in assisting the region since 1999, when it launched project RAS/6/032, 'Regional Screening Network for Neonatal Hypothyroidism'. As reported during the project co-ordination meeting held in October 2002 in **China**, from January to September 2002, 1 354 307 newborns were screened, of which 241 newborns were identified with CHT. The level of screening in the region has increased to nearly 2 million newborns a year, an increase of 45% compared with 2001. The rate of test sample recall and number of unsatisfactory samples has also been reduced, averaging just below 1% at present. There is also a reduction in the number of days from birth to treatment, which in most cases is now less than a month. These results reflect an improvement in the quality and standard of screening practices.

100. **China, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Vietnam** have been assisted in building capacity to use nuclear techniques to assess the effectiveness of nutritional supplementation programmes through project RAS/7/010, 'Measuring the Effectiveness of Multinutrient Supplementation'. As a result of the project, the counterpart staff have gained experience in the monitoring methodologies adopted in other countries in the region and on best practices for a successful nutritional intervention programme to improve the nutritional status of vulnerable groups. This has improved the national governments' policy and programme in the alleviation of micronutrient deficiency in the region. The investigations carried out in Indonesia using stable isotopes to measure the effectiveness of fortified wheat flour have attracted the co-sponsorship of the United Nations Children's Fund (UNICEF). China and Pakistan are using the lessons learned from Indonesia's experience to perform studies to advise their national governments and policy makers for improving or formulating nutrition policies. In China, anaemic children who were given iron-fortified fish sauce, returned to normal blood iron levels within a period of three months.

101. The Asian Development Bank (ADB) has recognized the Agency as its technical partner when working with nuclear technologies to verify results and confirm standards. An important achievement of project RAS/7/010 is the development of a strategic plan in response to the ADB initiative on the reduction of micronutrient malnutrition in Asia through food fortification and plant breeding.

#### **B.2.4 Environmental Remediation and Protection**

102. With rapid economic development and population growth in the southeast Asia region, inadequate water supply and air, water and soil pollution have received more attention.

103. An RCA and a national project are helping the region solve problems associated with harmful algal blooms. Fish and shellfish ingest toxins from the blooms, which then can be passed on to humans when these fish are eaten. The Agency is assisting regional counterparts to test for these toxin in fish in a more efficient manner. Through project PHI/7/006, 'Nuclear Techniques to Study the Red Tide Problem', there was a significant effort from the **Philippines**, with an in-kind contribution, to assist the regional project by scaling up the production of tritiated saxitoxin (3H-STX) to be used for the regional

intercomparison exercise for receptor-binding assay (RBA). The Agency provided a piece of equipment, along with expertise, to this effort. This activity is essential to the project because the production of 3H-STX was halted by the commercial supplier in early 2002. RCA project RAS/8/076, 'Better Management of the Environment and Industrial Growth', transferred nuclear technologies for RBA and radiometric dating of sediment cores to **China**. A new interregional project for the 2003–2004 programme (INT/7/015) was developed based on the lessons learned and the achievements of the Philippines and RCA projects.

104. Regional RCA project RAS/0/033, 'Role of Nuclear Power and Other Energy Options in Mitigating Greenhouse Gas (GHG) Emissions', was completed in 2002. As a result of this project, the Agency's methodologies and tools for carrying out GHG mitigation studies were imparted to participating Member States so that they are able to apply such methodologies and tools in conducting their respective GHG mitigation analyses.

## **B.2.5 Water Resource Management**

105. A major breakthrough in locating significant deep groundwater resources in northwest **China's** arid region has been achieved by the Ministry of Land and Resources. The first achievement was made in 1997 in Fuping County in the southern part of the Erdos basin where a 780-metre deep exploration well encountered a high-yielding aquifer. Isotope hydrology tests showed the aquifer could yield more than 10 000 cubic metres per day of potable water. Over the past few years, infrastructure for the harvesting of the well water has been built.

106. In 2002, China Central Television broadcast live the official opening and switch-on of the Fuping County production well. Officials and locals gathered to celebrate the opening of the deep well for water supply near the capital town of Fuping County, central Shanxi province. The opening of the well is considered a major achievement in the development of the deep groundwater resources in the karstic (limestone) aquifer in the region. The Vice Minister from the Ministry of Land and Resources and the Deputy Governor of Shanxi province were present at the opening ceremony. The opening of the well has resulted in an immediate improvement in the quality of drinking water available to many thousands of people in the region, who before this discovery had not only a water shortage but had to contend with poor water quality. Similar tests are being conducted in other parts of the basin.

107. The Agency programme has already established a network of sampling locations and developed an isotope sampling programme with over 420 samples collected. A key element of the groundwater resource assessment is to be able to collect samples from discrete levels in the deep aquifer formation to identify the different groundwater sources. This is being done through a special sampling device in the deep boreholes, some of which are up to 1000 metres deep.

108. The Agency provided assistance to the College of Water Resources and Environmental Engineering at Hohai University, Nanjing, **China**, to establish its new postgraduate semester course within the overall graduate training in hydrology. In the Black River basin of Inner Mongolia (project CPR/8/014), isotopes are being used to assist in developing a river water allocation policy for irrigation in the upper and middle reaches of the river and to understand the interaction between river water and groundwater.

109. Several studies have been performed in the field of groundwater hydrology of the Gunung Kidul area of **Indonesia**. The flow rate and interconnection between the underground stream at major caves have been established based on isotopic tracer methods. The groundwater level has also been observed from domestic wells. Significant results of project INS/8/023, 'Groundwater Resources Exploitation in the Gunung Kidul Area', suggested that there is no interconnection between the groundwater stream at Bribin and Seropan caves. This is a key outcome from the Gunung Kidul groundwater project because an ongoing irrigation water supply was identified to be sustainable and to not affect drinking water supplies. All information obtained from this work is important to the area for several reasons: (i) low-cost drinking water for the people in Bribin; (ii) the exploitation of groundwater resources; and (iii) the agriculture development plan in the Seropan area. The deep groundwater has the potential to be regionally distributed for irrigation both at Gunung Kidul but also to the west of Gunung Kidul in the sandy soil of the coastal area of Bantul District.

### **B.2.6 Industrial Applications**

110. Project THA/1/009 was undertaken to introduce Rutherford backscattering spectrometry (RBS) for environmental and material analysis at the Low Energy Accelerator Centre, Chiang Mai University. The Centre already possessed a 150-keV operational accelerator, which has now been upgraded to 400 keV. Additional modifications have been made to the ion source assembly. As a result, the counterpart is now providing an extended range of services, from modification to characterization of materials by ion beam techniques to the National Electronics and Computer Technology Center in Bangkok, **Thailand**. During project implementation, the Chalmers University of Technology in Gothenburg, Sweden, donated a 1.7-MV Tandetron accelerator equipped with an ion beam analysis end-station. The accelerator installation will be completed in 2003, and with it, the counterpart will extend ion beam analysis capabilities by introducing proton induced X-ray emission and conventional RBS. The Agency contributed to the donation process with expert services and shipment facilitation.

111. Radiation vulcanized natural rubber latex (RVNRL) has been introduced to the industrial sector in **Sri Lanka** through project SRL/8/017, 'Radiation Processing for Industrial Applications'. A private company, Rex Industries (pvt) Ltd., has successfully used the RVNRL supplied by the project counterpart as a binder for coconut fibres to manufacture pots to replace the plastic containers used in greenhouses and nurseries. The company has also produced samples of this product for an exhibition in Japan, and is now prepared for further trials and commercial production.

### **B.3. Europe**

112. In 2002, the emphasis of the technical co-operation programme in Europe was to further strengthen the safety and security infrastructures in Member States towards self-reliance; to address newly emerging challenges such as decommissioning of nuclear power plants or their life extension; to upgrade radiation and waste safety infrastructures; to contribute to the success of national health programmes; and to find remedies for major environmental issues in the region, while increasing the share of donor and government

participation in project financing and implementation. However, co-ordination of safety and security activities remained the highest priority in the region.

113. In preparation for the 2003–2004 technical co-operation programme, an effort was made to reduce the number of national projects, concentrating the limited financial and human resources in a few high-priority areas. As a result, the number of national requests submitted for the new cycle was reduced to less than 130 (from 165 in previous cycle) reflecting more effective upstream work and increased counterpart awareness of the Technical Co-operation Strategy. Moreover, the quality of project proposals was higher than the previous cycle. Member States participated in the planning and formulation of Europe's regional projects through four regional meetings organized in 2002. During the third meeting, which took place in conjunction with the 46th session of the General Conference, representatives of all recipient Member States in the region and a number of donors had the opportunity to review and approve the 2003–2004 regional programme, consisting of 29 projects. These new regional projects include an agreed list of target countries per project, a project plan and defined performance indicators. Extensive collaboration also took place with the Agency's respective technical divisions during the preparation of the programme.

114. Direct governmental cost-sharing of technical co-operation projects by their recipients reached a record level of \$670 000 (**Croatia, Czech Republic, Hungary, Latvia, Poland and Slovakia**). As in the past, Europe's programme received significant extrabudgetary contributions from the USA.

115. Five new CPFs were completed for **Belarus, Croatia, Cyprus, Hungary, and The Former Yugoslav Republic of Macedonia**, endorsed by the Agency and approved by the governments in 2002, bringing the total number of finalized CPFs in Europe to 21. CPFs proved to be an effective tool for identifying short- to medium-term national priorities, and are available, in draft or in signed form, for every country of the region.

### **B.3.1 Nuclear Security**

116. Subsequent to the report on Protection Against Nuclear Terrorism in November 2001, the Nuclear Security Action Plan was approved by the Agency's Board of Governors in March 2002. As a result, the Agency adopted a comprehensive approach to planning and implementing measures to protect against nuclear terrorism. The approach, or Action Plan, reflected in the eight activity areas described in document GOV/2002/10, brings together Agency activities concerned with security of nuclear material, physical protection, illicit trafficking, nuclear installation and radiological source safety, protection of information technology infrastructure, emergency response, nuclear material accountancy, and regulatory structures and international instruments. Many on-going technical co-operation activities within the 2002 programme corresponded closely with the Action Plan.

117. Security-related programmes in Europe provide an important reference for the Agency's future involvement in security and represented a major part of the delivery side of the Action Plan. The Department of Technical Co-operation is more than a delivery mechanism; in consultation with Member States and according to their needs as defined in their CPFs, the Department co-ordinates the technical co-operation programme to enhance awareness and to build capacity in Member States with support from the Office of Nuclear Security, the Division of Nuclear Installation Safety, the Division of Radiation and Waste

Safety, Department of Safeguard's Division of Technical Support, the Office of External Relations and Policy Co-ordination, and the Office of Legal Affairs.

118. A major role in combating illicit trafficking of radioactive materials belongs to the law enforcement agencies. Through project RER/9/060, customs and police officers discussed the concept of a 'model crossing point' in January 2002 together with nuclear technology experts and manufacturers of hand-held isotope identifiers. The January meeting helped to shape a co-ordinated research project 'Improvement of the Technical Means for the Detection of Illicit Trafficking of Nuclear and other Radioactive Materials', which is led by the Department of Safeguards. This is a good example of how the work under the technical co-operation programme, which concentrates on the delivery of assistance to Member States, feeds into the Agency's regular programme activities for the provision of methodological, scientific and technical assistance.

119. The concept of a 'model crossing point', elaborated and tested in project RER/9/060, has been successfully implemented in the national project BYE/9/008, 'Prevention of Illicit Trafficking in Nuclear and Radioactive Materials', in **Belarus**. As a result of the first phase of the project (2001–2002), two model customs crossing points in the Kozlovichi automobile cargo border checkpoint and the Brest railway cargo customs checkpoint were installed and commissioned. The second phase of the project will establish a national customs automated information system.

120. Another example of synergy between technical co-operation and the regular programme is the work carried out under project RER/9/060 in 2002 on the development of training materials. The project drew heavily on the experience of the Russian Customs Academy and the Institute for Transuranium Elements of the European Commission (Germany). Special meetings were arranged with the most active participants of the previous years' training events. Based on their feedback, the existing materials have been substantially revised and new lectures have been developed. The new developments have been immediately applied in three major regional training events: St. Petersburg and Vladivostok (**Russian Federation**), and Ohrid (**The Former Yugoslav Republic of Macedonia**). The latter event is also an indication that the geography of assistance is widening, mainly to the Balkan States, whereas in previous years more attention was given to the states of the former Soviet Union.

121. The search for orphan sources in suspected areas of **Georgia** was completed in 2002. The operation helped to alleviate public concerns, which had persisted for over five years as a result of the discovery of several highly radioactive orphan sources. Corresponding projects (GEO/9/004 and GEO/9/006) received extrabudgetary and in-kind support from France, Germany, India, Turkey and the USA. The Georgian regulatory authority, established and trained under the radiation protection project, participated actively in this operation. The search operation permitted the monitoring of almost 90% of areas suspected of having orphan sources (about 10% of the Georgian territory) and confirmed that they were free from radioactive sources or radioactive contamination. A mobile laboratory equipped with environmental radiation monitoring and measurement systems was provided by Germany as an in-kind contribution. The laboratory helped to improve the radiological situation in Georgia, and strengthened radiation monitoring.

### **B.3.2 Nuclear, Radiation and Waste Safety**

122. The safety of NPPs and the role of nuclear regulatory authorities in Member States that are candidates for accession to membership of the European Union continued to attract considerable attention. In June 2002, an Agency safety mission under project RER/9/066, 'Strengthening Management of Operational Safety at NPPs and Utility Organizations', provided a final review of more than a decade of safety upgrades and assessments at Kozloduy-3 and -4 in **Bulgaria**. The mission team reported that many of the safety measures implemented exceeded those that were foreseen in the design, operation and seismic areas, and that the design and operational safety at this unit corresponded to the level of improvements seen at similar vintage plants.

123. For the majority of NPPs in the region, the main design safety issues were concerned with the interlinked topics of re-licensing, life extension, ageing, and periodic safety review. A number of related workshops on these topics were organized jointly with counterpart institutions and increased the knowledge and experience of Member States' experts. The nuclear utility ROSENERGOATOM in the **Russian Federation** plans to extend the operating lives of a number of its power reactors within 15 years. Under project RUS/9/003, 'Development of a Regulatory Basis for NPP License Renewal/Extension of NPP Operation', the Agency provided support to this organization in preparing and reviewing the relevant regulatory requirements and guidelines on NPP license renewal and life extension.

124. In **Romania**, assistance to the National Commission for the Control of Nuclear Activities (CNCAN), which is the regulatory body responsible for all licensing activities, has continued in 2002 through project ROM/9/019. The new obligations acquired by States under the Convention on Nuclear Safety have also been addressed. Several professional training courses on nuclear safety were organized, and the staff of CNCAN also received training in various topics dealing with radiation protection, nuclear safety, quality assurance, regulatory review, and inspection of nuclear facilities. According to the 2002 International Regulatory Review Team mission findings, CNCAN has a sound legal basis and is actively putting in place a series of regulations to implement the law. Activities in this area have been accelerated by CNCAN and they are now 50% complete.

125. During the regional planning meeting held in October 2002, the subjects of NPP lifetime management and NPP life extension were identified. These are important issues for both utilities and the regulators. This, together with the general unwillingness of governments and organizations to commit to building new nuclear plants, has created a strong impetus amongst utilities to extend the operating life of their existing plants. Although there are different processes, they do have many common features, such as the need for design base documentation, a safety analysis that reflects the current plant status and a thorough understanding of plant ageing effects. The 2003–2004 regional programme in Europe was subsequently modified to address the key aspects of lifetime management.

126. Altogether, 18 Member States participated in projects on upgrading radiation protection infrastructure in 2002. Thirteen countries (**Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Georgia, Hungary, Malta, Portugal, Romania, Slovenia, The Former Yugoslav Republic of Macedonia, and Turkey**) were involved in project RER/9/062, 'National Regulatory Control and Occupational Radiation Protection

Programmes' (milestones 1 and 2), while five countries (**Albania, Estonia, Latvia, Lithuania, and Republic of Moldova**) were engaged in implementing milestones 3, 4 and 5 under project RER/9/065, 'Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure'. In 2002, six countries participating in project RER/9/062 completed the principal requirements of milestones 1 and 2. In two cases (Georgia and Turkey), this has been confirmed by an independent peer review mission organized in 2002. Two additional countries (**Azerbaijan and Serbia and Montenegro**) expressed their interest in joining this project in the next programme cycle. With respect to the Member States participating in project RER/9/065, three of them seem to complete all relevant requirements and, after a successful peer review, may be the first countries to attain all five milestones.

127. Training material on safety assessment for near surface disposal facilities has been developed during the last two years under project RER/9/067. The material was used in the training courses and workshops organized in 2002. It was recognized that the existing theoretical material is relevant to test cases addressing real problems. Special workshops were devoted to issues of processing waste from decommissioning at the centralized facilities, liquid radioactive waste, and management of spent sealed radioactive sources. In **Slovenia**, project SLO/4/005 has made progress to help the Slovenian Agency for Radwaste Management (ARAO) establish a new near-surface disposal facility for low- and intermediate-level wastes arising both from the Krsko NPP and from nuclear applications. A waste inventory has been developed; staff of the ARAO were trained and advised on modelling generic disposal concepts and generic host sites, quality assurance procedures, site characterization methodology, and on carrying out a performance assessment of the conceptual repository. A liquid waste cementation facility was established in **Latvia**, with in-drum cementation and conditioning of solid waste in connection with decommissioning of the Salaspils Research Reactor. Additionally, an incident management centre has been established at the Radiation Safety Centre for the effective management of radiological incidents, decreasing the potential radiological risk to the public. In the **Republic of Moldova**, waste storage facility plans were finalized under national project MOL/4/003.

128. Given the number of ageing nuclear facilities at or near the end of their life cycle around the world, many countries will face the task of decommissioning. They will also have to address the related issues of dismantling, decontamination and disposal of the structures, equipment and other materials from these facilities in a publicly acceptable manner. Conscious of the importance of decommissioning for public acceptance of nuclear technologies, the Agency continued to provide assistance in 2002. In **Bulgaria**, a project management information system to support the decommissioning programme of Kozloduy NPP Units 1 and 2 has been established through project BUL/4/008, with government cost-sharing. Technical advice was provided to **Lithuania** in connection with the decommissioning of Ignalina NPP, and workshops and seminars were organized for high-level representatives from Lithuanian authorities. Project LIT/4/002, 'Support for Decommissioning of Ignalina NPP Unit 1', received extrabudgetary contributions from France and the United States of America.

129. Within the framework of project SLR/4/008, 'Robotic Technologies for the Decontamination and Decommissioning of Bohunice A-1 NPP', in **Slovakia**, activities were initiated in 2002 to offer technical advice to Nuclear Power Plant Research Institute Trnava Inc. (VUJE) so that it can efficiently plan operations dealing with the dismantling of certain parts of Bohunice A-1. These operations include remotely operated robots and machines for decontamination, dismantling and waste removal, as well as ALARA planning, worker

training, and cost estimating. Through project UKR/4/007, 'Decommissioning of WWER-Type NPPs', a first document on the decommissioning strategy in **Ukraine** for NPPs with water-cooled water-moderated power reactors (WWERs) was completed in 2002 and is now available for governmental authorities. Specific decommissioning activities were carried out for the Chernobyl NPP and Chernobyl Shelter. Based on increased interest on decommissioning planning, a high-level meeting was held 12–13 December 2002 at the Agency with representatives from **Armenia, Bulgaria, Hungary, Lithuania, Slovakia, and Ukraine**. The workshop aimed at sharing information on approaches and methods for decommissioning of NPPs in Central and Eastern Europe (CEE), and developing recommendations to foster the identification and elaboration of effective guidance for nuclear decommissioning decision-making processes.

130. Regional project RER/9/058, 'Safety Review of Research Reactors', has been the main vehicle of assistance to such installations in CEE since 1999. Four years into the project's implementation, a review of the results was necessary, as well as an agreement on the kind of assistance required in the future. This was the purpose of a project review meeting gathering all stakeholders and technical experts in Vienna in November 2002. The participants provided feedback on the usefulness of the past project activities which included Integrated Safety Assessment of Research Reactors missions, topical workshops on emergency preparedness, extended shutdown, fuel management and safety culture, as well as the work to support the Agency/Russian Federation/United States of America initiative on the possible return of the Russian origin research reactor fuel from the facilities in the region to Russia.

### **B.3.3 Human Health**

131. The success of radiotherapy for the treatment of cancer in terms of the probability of local control of the tumour depends upon an adequately high dose of radiation delivered to the intended target volume. At the same time, the limiting factor in radiotherapy treatment is the probability of complications in the normal tissues close to the high dose regions. Both of these aspects make strong demands on the accuracy and precision of the treatment delivered to the patient (an ultimate check of the actual treatment given can only be made by using in vivo dosimetry). As a result of project ALB/2/009, 'Radiopharmaceutical Production and Quality Control', with the Institute of Physics in Tirana, the first technetium-99m kits started to be produced locally in **Albania** in 2002 and distributed to local hospitals. The Agency also contributed to the establishment of the quality control system for the production of radiopharmaceuticals, as well as to the completion of a study on skin cancer to develop the cancer management strategy and the basic infrastructure for the resulting treatment.

132. Project EST/6/003, 'Upgrading Dosimetry Practices in Oncology Services', helped to establish and implement in vivo dosimetry at two radiotherapy departments of **Estonia** (the North Estonia Regional Hospital Cancer Centre, Tallinn, and Tartu University Clinics). Both radiotherapy departments have received in vivo dosimetry systems. Through the upgrading of the secondary standards dosimetry laboratories at the Maria Skłodowska-Curie Memorial Cancer Centre and the Institute of Oncology, Warsaw, **Poland**, the calibration service in radiotherapy and mammography has been expanded, improving the quality of thermoluminescence dosimetry audit services and the accuracy of radiation dosimetry.

133. For the proper and effective monitoring of radiation exposure, the calibration of equipment is essential. The objective of project MAK/1/002 is to establish the first calibration laboratory for radiation protection level dosimetry in **The Former Yugoslav Republic of Macedonia**. In the first year of implementation, due to a difficult political situation, the project was delayed. Then in the second year, the Agency, with strong commitment from the national counterpart, which allocated the necessary financial resources and initiated the civil construction work, succeeded in implementing a majority of the planned activities in a very short time, nearly meeting the initial time schedule.

### **Humanitarian Demining Work Continues**

A regional project in Europe, 'Field Testing and Use of a Pulsed Neutron Generator for Demining' (RER/1/005), is the first Agency project to field test a nuclear technique for humanitarian demining. As there are a variety of nuclear techniques which may be used, the initial task was to choose the most promising one. The project used the results of a related co-ordinated research project and two Advisory Group Meetings organized by the Department of Nuclear Applications. The instrument chosen is called PELAN and is based on the pulsed fast-thermal neutron analysis technique. Early in 2002, the instrument was delivered to Vienna and demonstrated to the scientists and deminers from various countries, including those outside of Europe. The instrument procured under the project is maintained by the Agency's laboratory at Seibersdorf. PELAN is well beyond the design stage and into the application and testing stages, but it has limitations, including when a mine lies deeply buried in the ground or the amount of explosive is small.

A worldwide call for proposals on how to improve PELAN was made. In mid-2002, an international panel of experts reviewed the proposals, and two subcontracts were awarded under the project to institutions in the Netherlands and the United Kingdom to elaborate their ideas. In October 2002, the first field test of PELAN (without improvements) was carried out by independent experts of the Croatian Mine Action Center at a test field close to Zagreb. The experts concluded that PELAN should have no problems with recognizing antitank mines buried under 15 cm of soil, whereas the recognition of small antipersonnel mines under 5 to 10 cm of soil is quite probable, but more tests are needed to verify the results. In 2003, more extensive tests will be conducted in **Croatia** to provide a baseline for testing the future improvements.

## **B.4. Latin America**

134. In 2002, the Latin America region demonstrated its ability to improve the quality of the technical co-operation programme for 2003–2004 through stronger ownership of their projects. This is reflected in the amount of national resources allocated to the governmental priority needs addressed by the technical co-operation programme. While the level of economic and technological development in some sectors of the countries is notable, it became clear from consultations with Member States during the preparation of the national portfolio of projects for the 2003–2004 programme that there is a continuing need for capacity building in various areas to enhance the contribution of technical co-operation. Some countries that are well-developed in certain areas of nuclear technology still require

further advancement of capabilities or integration of new techniques. For other countries, capacity building is crucial prior to any activity that may specifically contribute to solve development problems. The different levels of abilities in the region have been considered while preparing the programme for 2003–2004, which incorporates capacity building to support the sustainability of the resources invested both by the Member States and the Agency.

135. The strategy described above has been applied with success in strengthening technical co-operation in a least developed country such as **Haiti**. The initial efforts to enhance awareness at the highest levels of government in Haiti for the development of national priority programmes have led to national projects. In addition, the Government integrated the efforts of the institutions in the water and the energy sectors in addressing the pressing issues of water and energy availability to optimize scarce resources. For example, collaborative work between the end-user institute and the government agency for energy has been initiated to improve energy planning in the country. Likewise, collaborative efforts between water utility companies and the counterpart governmental institution have begun to address water problems in the metropolitan area.

136. While finalizing the programme, the Agency was mindful of the current globalization trends and the modernization processes in the Latin American region, which have caused adjustments to the organizational structures in many counterpart institutions. The region is engaged in careful planning and paying closer attention to the decisions made under regional economic uncertainty. Some Member States have requested the Agency to support national workshops for the development of national programmes based on their prioritized needs. In the last quarter of 2002, the Latin America Section initiated activities to respond to these requests and consulted with the technical departments to prepare updated information on the available technical capabilities to solve development problems specific to the region.

137. Activities under the Co-operative Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL) are a mechanism to foster regional co-operation for sustainable development through the support of the technical co-operation programme in the region. A strategic analysis of the programme in the region was made in August 2002 by the representatives of the countries where ARCAL activities are implemented. A vision and strategic actions for Phase V of the ARCAL activities were discussed during this meeting and agreed upon. The President of this meeting requested a stronger commitment from Member States in Latin America to bring about the ten ratifications needed for its entry into force in 2003.

138. Following the lessons learned during the upstream work of the previous cycles to define and formulate national and regional project proposals, the Latin America Section introduced a model for an integrated upstream workplan at the end of 2002. A comprehensive understanding of the development stages, policies and priorities in Member States represents the specific basis for the upstream work process. The main responsibility for defining the national upstream work process stays with Member States with the assistance of country officers and technical officers upon request, according to the stage of the upstream work process.

139. Counterparts from the prioritized projects will be trained in the utilization of the logical framework methodology through regional or, upon request, national training events

and further assisted, primarily by technical officers, to formulate the technical concept of the projects.

140. Through the regional project RLA/0/020, 'Strengthening the Institutional Infrastructure in the Nuclear Sector through Strategic Planning', **Brazil, Cuba and Uruguay** are ready to share their experience in strategic planning of the nuclear sector to significantly align the nuclear institutions with the development policy of their respective governments. Brazil initiated market-oriented reforms in the late 1990s, which have influenced the role of public institutions, including the national nuclear institution. Cuba has already introduced highly advanced management tools in the nuclear sector following the latest planning approach in the country.

141. Also under project RLA/0/020, the Peruvian Nuclear Energy Institute (IPEN) made progress in strategic planning of the nuclear sector in 2002. The institute contacted more than 140 institutions in the country to become strategic allies and end-users of IPEN's capabilities. This pro-active approach may be extended to other countries to contribute to the consolidation of public institutions in the nuclear field.

#### **B.4.1 Nuclear, Radiation and Waste Safety**

142. With **Venezuela** joining project RLA/9/041, 'National Regulatory Control and Occupational Radiation Protection Programmes', the number of countries participating in this project increased to 14 out of 20 from the region. Two main activities have been implemented: the regional inter-comparison exercise, which is currently being carried out in the whole region; and the national plan of radiological emergencies, which is at different stages of implementation in nine countries. In 2002, **Colombia** and **El Salvador** updated national radiation protection regulations based on the Basic Safety Standards.

143. As an example of TCDC, bilateral activities implemented under project RLA/9/044, 'Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure', used experts from the Argentinian national regulatory body to assist its Uruguayan counterparts in training inspectors and carrying out fellowships, following the project workplan agreed to with the Agency.

144. The need for practice-specific regulatory documents to harmonize regulatory activities on the control of practices involving radiation sources was identified four years ago. Project RLA/9/028, 'Guidelines on Control of Radiation Sources ARCAL XX', was formulated to assist participating countries (**Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Peru, Uruguay and Venezuela**) draft regulatory documents for the most common practices in industry and medicine. The resulting documents have been used to train Latin American regulators from Argentina, Brazil, Chile, Cuba, Mexico, Peru, Uruguay and Venezuela through project RLA/9/043, 'Improving the Effectiveness of Regulatory Management ARCAL LXVI'. These training courses were the first to use the standard syllabus prepared by the Agency to implement a package of practice-specific regulatory documents and training of regulators.

## **B.4.2 Energy Development and Planning**

145. One of **Brazil's** ongoing projects, BRA/4/052, 'Fabrication Process Development of the Uranium-Gadolinium Nuclear Fuel for Nuclear Power Plants', has brought together three counterparts (technological, scientific and industrial) to contribute to the production of 1000 fuel rods per year of uranium-gadolinium fuel for Angra I and II. The capability for accurate and precise chemical analysis of rare elements will have a positive impact on the mining programme at Buena site. The technical assistance from this project will enable the Navy Technology Center in São Paulo together with the State University of Maringa and Brazilian Nuclear Industries to overcome technical bottlenecks and obtain a feasible and economical fabrication process to produce uranium-gadolinium nuclear fuel in Brazil. The use of uranium-gadolinium oxide fuels in pressurized water reactors extends safety operational margins.

146. Project BRA/4/049, 'Modernization of NPP Control Room and Operator Support Systems', is also a good example of partnership and commitment between **Brazil** and the Agency. At Angra NPP, the Agency is assisting personnel in addressing human factor issues relevant for designing and upgrading control rooms and support systems of NPPs through the implementation of a human-system interface laboratory. The laboratory will provide support for the modernization of Angra I and II and for the evaluation and licensing of new interface concepts, which will be used in Angra III NPP. The laboratory will be the only human factors research facility located below the Equator.

147. **Mexico** incorporated nuclear energy into its electricity generating system in 1990. The Laguna Verde NPP operates two boiling water reactors, producing 10 000 GW·h (5% of the national electricity production). The Electrical Research Institute designed and built the simulator used for training the operators of the Laguna Verde NPP, which needed to be updated in order to incorporate new computer technology. Within the framework of project MEX/4/050, 'Advanced Graphical Analyzer for Nuclear Process', the latest nuclear reactor simulation technology has been transferred successfully to Mexico and is being incorporated into the new digital reactor simulator for the reactors of the Laguna Verde NPP.

## **B.4.3 Water Resource Management**

148. The second year of the regional project RLA/8/031, 'Sustainable Management of the Groundwater Resources in Latin America', promoted the integration of national efforts from 30 institutes dealing with the water sector in **Chile, Colombia, Costa Rica, Ecuador, Paraguay, Peru** and **Uruguay**. The regional group activities encouraged the exchange of scientific results and managerial approaches for water management that are being employed in the respective national settings. The conceptual models of the Santiago aquifer in Chile, the three aquifers in Colombia, the Barba aquifer in Costa Rica, the Quito aquifer in Ecuador and the Alto Piura aquifer in Peru have been completed. Groundwater of different origins and the five possible sources for recharge to the groundwater in the aquifer in Chile have been identified using isotopic techniques.

149. Information from the models will be used to define the best place to drill wells in the respective countries. In addition to these results, the monitoring network has been

established and operated to support the periodic measurements of the groundwater parameters that are essential for sustainable water management. The development of the legal framework for water resources management has likewise started. A web page on the project (<http://www.udep.edu.pe/recursoshidricos>) disseminates the results to the general public and highlights the importance of multidisciplinary hydrogeological investigation for better management of the groundwater resources.

#### **B.4.4 Food and Agriculture**

##### **Integrated Pest Management Brings Medfly Under Control**

During the first phase of project RLA/5/045, 'Preparation for Pilot Fruit Fly-Free Area Using the Sterile Insect Technique', all Central American Ministries of Agriculture have consolidated their pest control efforts and created special programmes dedicated exclusively to integrated pest management on an area-wide basis in order to create recognized fruit fly-free or low prevalence areas for agricultural production. As a result of these efforts, **Nicaragua** has officially declared Ometepe Island free of Mediterranean fruit fly. **Costa Rica** certified the absence of medfly in the Los Inocentes pilot zone. **Guatemala** has already prepared the documentation to certify that the peach production zone in Quetzaltenango's Valley is free of medfly. The ministries of agriculture in the region have admitted that the first phase of the project has encouraged them to face the medfly problem as a domestic matter, and that the solution largely depends on what actions the participating countries take. The ministries also note the current project achievements would have been difficult to attain without assistance from the Agency and the United States Department of Agriculture's Animal and Plant Health Inspection Service.

150. In **Peru**, barley is grown in the highlands, at altitudes around 3000 metres. Through Agency assistance, Peruvian plant breeders developed a mutant variety of barley, "UNA La Molina 95", using radiation-induced mutation. This variety is drought and frost resistant, has high nutritional value, matures early, and provides greater yields (2000 to 4000 kg/ha) than traditional varieties currently planted (1190 kg/ha), even under the harsh conditions and unsophisticated agronomic practices in the highlands. Because it lacks a hull, processing for local consumption is easy. Within the framework of project PER/5/024, 'Introduction of Barley and Other Native Crop Mutant Cultivars', the seed production capacity of the counterpart was increased to support the widespread cultivation of the new barley variety in the Andean highlands. The Government has contracted the counterpart to produce sufficient barley seed to cultivate 40 000 ha, meeting the needs of the more than 300 000 people now resettling their farms in the highlands.

#### **B.4.5 Industrial Applications**

151. Through project CHI/8/024, 'Nuclear Techniques in Copper Mining', the use of prompt gamma neutron activation analysis (PGNAA) was successfully adapted in **Chile**. This technique can provide relevant information for copper ore grade determination, both for borehole logging and online analysis on conveyor belts. The calibration results encouraged

the Chuquicamata Division of the National Copper Corporation of Chile and the Centre for Mining and Metallurgy Research to routinely use two gauges in the mine to improve the operations and obtain the information on the copper grade online and in real time. This provides the grade controller of the mine with better information about the mined product. It decreases copper ore grade variability at the plant feed and improves copper recovery. Through this project, a national capability has been developed for designing, calibrating and applying the PGNAA technique in the copper industry of Chile. This technique will eventually be transferred to other Member States in the region.

152. Project RLA/8/032, 'Application of Isotope Geochemistry in Geothermal Development and Environmental Management', continued to support the development and management of existing geothermal reservoirs and the exploration of new areas in **Costa Rica, El Salvador, Guatemala, Nicaragua and Panama**. The isotope and geochemical laboratory established in El Salvador has become self-reliant and provides services for this project as well as other isotopic analytical requirements to other countries in the region. As a result of this project to date, substantial economic impacts were achieved in El Salvador. The radioactive tracing tests in the Berlin geothermal field indicated that re-injection fluids do not flow back into the production sector. This conclusive evidence, complemented by multi-disciplinary results of geophysical measurements and geochemical assessment, saved the cost of drilling two re-injection wells, equivalent to at least \$5 million. As a result of this evidence, no modification to the re-injection strategy has to be made, further saving the costs for civil works on the pipelines. In addition, the conceptual geochemical models of the geothermal systems were updated for the sustainable management of the reservoir. This supported the increase of electricity generation capacity from 7 MW(e) in 1995 up to 54 MW(e) in 2002 in Berlin. The project likewise supported the analysis of 30 samples for isotopes and chemical composition in three exploration areas. Because of a substantial understanding of the exploration areas, the company has the confidence to invest in drilling four exploration wells in these areas.

#### **B.4.6 Human Health**

153. Project RLA/4/017, 'Quality Control in the Repair and Maintenance of Nuclear Medical Instruments', has been operational since 2001 with the participation of **Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela**. This project has been extended through 2004 to help national and regional centres achieve self-reliance. The regional centres in Brazil, Cuba, Mexico and Peru have enhanced their capacity through training and all national laboratories of participating countries have strengthened their ability to perform a proper fault identification of nuclear instruments as well as to maintain their instruments. Five unique low-cost test instruments were designed and the mass-production of the test instruments for the participating Member States was launched.

154. **Cuba** has an efficient system for developing and providing maintenance services in nuclear instrumentation, but the procedures applied to the pieces of equipment used in industry, medicine and environmental monitoring were not in accordance with International Organization for Standardization (ISO) standard ISO-9000. Through project CUB/4/010, 'Strengthening Nuclear Instrumentation Services', a high-quality nuclear instrumentation laboratory has been established. This laboratory has obtained ISO standard ISO 9002:1995 certifications for repair and maintenance of nuclear instrumentation, providing nearly 160

services a year to 80 different clients. New technical procedures for quality control of radio-diagnostic equipment and for taking measurements with counting and spectrometer systems are being implemented. New ISO 9000:2000 certification is also being sought.

155. In **Bolivia**, through project BOL/6/022, 'Chagas' Disease and Its Evaluation in Nuclear Medicine', application of nuclear medicine techniques led to the discovery of consequences of Chagas' disease in the patients' hearts. The technology transfer was successfully achieved through the implementation of several fellowships, expert missions and the delivery of a single photon emission computed tomography gamma camera for each nuclear medicine centre. The new nuclear medicine capacity created in Bolivia has increased the coverage of nuclear medicine services. In 1999, only 20% of those people diagnosed with Chagas' disease were treated; in 2002, the percentage is 70%.

## **B.5. West Asia**

156. The appraisal process was completed successfully for the national and regional project requests for the 2003–2004 technical co-operation programme. The programme approved by the Board of Governors included a package of 60 national and regional projects for implementation in Member States of the West Asia region.

157. Apart from the **Islamic Republic of Iran** and **Kazakhstan**, the use of nuclear power for the generation of electricity has not been of any significant interest in the region. The main emphasis of technical co-operation continued to be on nuclear applications in the sectors of health, water management, environment, agriculture and industry. The situation where some Member States benefited mainly through the regional projects remained valid.

158. The implementation of the national technical co-operation projects for **Iraq** and its participation in some regional West Asia projects continued to be on hold during 2002 following the instructions of the United Nations Sanctions Committee.

### **B.5.1 Nuclear, Radiation and Waste Safety**

159. Significant progress was made by the 12 participating countries in the West Asia region for achieving the objectives of the two regional projects, 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'. **Tajikistan** started its participation in these projects as a new Member State. A significant achievement in 2002 for **Qatar** and the **United Arab Emirates** was the passing of their respective national legislations in compliance with the Basic Safety Standards and establishing the regulatory authorities. Guidance and support was provided to the participating Member States for the establishment of appropriate national legislation; on regulations for radiation protection, transport of radioactive material, and management of radioactive waste; and on establishing or maintaining a system of authorization and enforcement of radiation sources and practices as well as source inventories.

160. Some participating Member States were further supported to establish or maintain an individual external monitoring service to all radiation workers in the country. Support was also provided to those Member States on activities relevant to milestones 3–5 of the project.

The harmonization and co-ordination of such activities in the region were ensured through a four-day regional co-ordination seminar held in Vienna in May. Two participating Member States, **Saudi Arabia** and **Uzbekistan**, were peer reviewed in 2002 for the progress achieved in meeting various milestones of the projects.

161. Particular emphasis was given to the training requirements of the Member States under the two regional projects in radiation protection. Following the train-the-trainers approach, more than 300 technical and regulatory staff of the national regulatory authorities and user organizations were trained through fellowships and scientific visits, the one-year postgraduate training courses, and many specialized regional and national training events of shorter durations. The second postgraduate training course on radiation protection and safety of radiation sources, held in Arabic at the Higher Institute of Applied Sciences and Technology, Damascus, **Syrian Arab Republic**, was successfully concluded in June. The third postgraduate training course was started in September at the same host institute with the participation of 20 students from nine countries, including three Arabic speaking countries in Africa. In addition, five regional training events were devoted to the following: specialized radiation safety tasks in the areas of assessment of occupational exposure due to intake of radionuclides, held in the **Islamic Republic of Iran**; calibration of radiation measuring instruments at radiation protection levels, held in **Jordan**; radiation protection and safety in diagnostic and interventional radiology, held in **Kuwait**; safety of radioactive waste management, held in the **Syrian Arab Republic**; and regulatory authorization and inspection of medical practices, held in the **United Arab Emirates**. In addition, nine national training events were supported on specialized radiation safety tasks using standardized Agency training material.

162. The Agency provided support to the efforts of the **Islamic Republic of Iran** in reviewing the preliminary safety analysis report for the Bushehr Nuclear Power Plant, Unit 1. These reviews were carried out at the request of, and in close co-operation with, the owner organization as well as the national regulatory authority. The supporting projects for these activities were projects IRA/4/029, 'Strengthening Owner's Functions for Bushehr NPP Project', and IRA/9/015, 'Regulatory Infrastructure for Licensing of Bushehr NPP'.

## **B.5.2 Energy Development and Planning**

163. Under the project SYR/0/006, 'Energy and Nuclear Power Planning Study', the **Syrian Arab Republic** received advice and material on Agency methodologies and tools for analysis of energy systems, as well as training for a team of national experts to analyze the role of nuclear power and other energy options in the future energy mix of the country. As a result, the team was able to complete the national studies needed for the forecast of energy and electricity demand and successfully developed national energy demand and supply scenarios.

## **B.5.3 Food and Agriculture**

164. Sterile insect technique-based medfly control activities have made progress in **Israel**, **Jordan** and the **Territories under the jurisdiction of the Palestinian Authority**. Projects ISR/5/010, JOR/5/009 and PAL/5/002 have been supported mainly through funds provided by the United States Agency for International Development's Middle East Regional Cooperation Program. The effectiveness of aerial releases of sterile medfly males over the

Arava/Araba Valley has contributed to increasing exports of medfly-free commodities to the USA. This has encouraged the Israeli and the Jordanian authorities to initiate steps for studying the prospect of a jointly funded and operated medfly rearing facility to be constructed in the region.

165. The Agency has been involved in consultations with the authorities in **Israel** and **Jordan** and other interested parties. Establishing such a facility in the region would greatly help the efforts for medfly control on a medium- and long-term basis. The relevant national authorities have initiated measures for sustaining the results on a long-term basis. The steps taken include the purchase of aircraft by the user organization in Israel for the aerial releases, and the provision of funds by the Jordanian authorities for the implementation of project activities.

166. Major transboundary diseases are still one of the constraints to the development of the livestock sector in **Yemen**. The diagnostic technologies transferred and skills generated under the project YEM/5/004, 'Improving the Diagnosis of Animal Diseases', were instrumental to the early diagnosis and containment of the recent Rift Valley fever outbreak in Yemen. The assistance provided to Yemen through regional and national projects has helped the country work towards declaring itself free of rinderpest and to embark on the International Office of Epizootics' pathway for final certification.

#### **B.5.4 Water Resource Management**

167. The Agency assisted **Yemen** under project YEM/8/002, 'Isotope Hydrology Investigation in the Sana'a Region', in the study of a deep and shallow groundwater system and the assessment of the contribution of rainwater and dam water in the basin. The results obtained so far have helped in identifying the nature and source of recharge to shallow groundwater and for estimating the efficiency of different dam reservoirs for artificial recharge. A part of this data was shared with the World Bank team carrying out pre-project studies on sustainable water management in the Sana'a basin.

#### **B.5.5 Environmental Monitoring**

168. In **Kuwait**, an environmental monitoring and radio-ecological study was continued under project KUW/9/002, 'Radiological Assessment of DU-affected Sites'. A sampling campaign was undertaken, with the support and assistance of the Kuwaiti authorities, and more than 200 samples were collected. The analysis of the samples was carried out at the Seibersdorf Laboratory and at the Spiez Laboratory in Switzerland. The laboratories completed their interim reports on the results, and further work was underway on the overall radiological assessment of the depleted uranium (DU)-affected sites and the preparation of the final report on the DU situation in Kuwait.

169. The Institute of Nuclear Physics (INP), Almaty, is building a national spatial database on radioactive contamination in **Kazakhstan**. The Agency has assisted INP, under the project KAZ/2/004, 'Establishing a Radiological Monitoring System in Western Kazakhstan', to establish a monitoring programme for assessing the radiological contamination around the less-investigated hazardous sites in western Kazakhstan. The Agency has also supported the upgrading of the geographical information system and the training of INP staff in the use of spatial analysis, modelling and geostatistics. In addition, a

pre-project mission visited Kazakhstan to assist in the development of a remediation methodology for the contaminated soils in the Shu-Sarysu province, and also to establish a phased monitoring and assessment programme for the study of trace and toxic elements and naturally occurring radioactive material in the boreholes in the Shu-Sarysu area. The mission's recommendations will be implemented under the new project KAZ/1/002, 'Development of Remediation Methodology for the Contaminated Soils in the Shu-Sarysu Province'.

170. The Agency has assisted **Israel**, under the project ISR/2/015, 'Measurement of Long-lived Radionuclide Tracers in Marine Environment', to further develop its accelerator mass spectrometry facility for carrying out studies on the transport of pollutants in the Mediterranean coastal environment. The Agency provided the counterpart with essential items of equipment.

### **B.5.6 Human Health**

171. **Tajikistan**, a new Member State, was provided technical advice on the assessment of its present status of nuclear medicine services. The management at the Institute of Gastroenterology, Dushanbe, was assisted with the formulation of a technical co-operation project proposal that focused on the improvement of nuclear medicine services for better patient care and treatment. This project will contribute to the efforts by the Tajik Government to rehabilitate its healthcare system. The recommendations of the mission were incorporated into the project TAD/6/002, 'Upgrading Nuclear Medicine Services', approved for the 2003–2004 programme cycle.

## A Landmark in the Healthcare System of the Syrian Arab Republic

The cyclotron facility for the production of short-lived radionuclides was completed, tested and made operational at the Dubaya Centre of the Atomic Energy Commission of Syria. The commissioning of the cyclotron is the culmination of a well-planned process initiated by the country more than eight years ago. The Agency provided substantial technical and material support to the country during all stages of the project. The technical co-operation project SYR/8/006, 'Feasibility Study for Cyclotron Facility', covered the techno-economical aspects of the feasibility study, specifications for the cyclotron suited to the purpose, and advice on the design and layout of the facility. The result of that project provided the necessary basis for the country to allocate more than \$10 million for the construction of the buildings, support services and the purchase of the cyclotron machine from Ion Beam Applications, Belgium. The Agency's follow-up project, SYR/4/010, 'Production of Diagnostic and Therapeutic Radiopharmaceuticals Using a Cyclotron', provided the required technical and material inputs relating to the acceptance tests, and the design and construction of the laboratory facilities for the production, safe handling and quality control of the radiopharmaceuticals based on the radionuclides produced in the cyclotron. The cyclotron facility, along with the other associated laboratory facilities, constitutes the centerpiece of the Nuclear Medicine Centre. The availability of this facility for the production of radioactive imaging agents for use with the advanced positron emission tomography and single photon emission computed tomography (SPECT) diagnostic techniques will contribute substantially to upgrading national healthcare for the **Syrian Arab Republic**.

The Syrian facility is the sixth of its kind in West Asia; the other operational facilities are in the **Islamic Republic of Iran, Israel, Kazakhstan, Saudi Arabia** and **Uzbekistan**. The Agency has also provided technical assistance to the cyclotron facilities in the Islamic Republic of Iran and Kazakhstan.

172. In **Uzbekistan**, a SPECT gamma camera facility has been supplied, installed and made operational at the Scientific Centre of Surgery at Tashkent under project UZB/6/003, 'Introduction of SPECT Technology'. This centre is a large medical complex with 11 surgical departments, three of which specialize in heart disease. The SPECT facility is the first of this kind in the country and will contribute substantially to modernizing the health sector.

173. Under project ISR/6/013, an expanded quality assurance programme for 3D conformal radiotherapy was successfully established at the Soroka University Medical Center, Institute of Oncology, Beer Sheva, **Israel**.

174. As a result of support provided under the project KAZ/4/005, 'Cyclotron Production of Radionuclides for Medical and Industrial Use', **Kazakhstan** succeeded in increasing the internal beam intensity of its old cyclotron to currents up to 500 microampere. This enabled the facility to successfully produce thalium-201 in adequate quantities to meet the demand of the Kazakh medical centres in Almaty. In addition, the cyclotron-produced gallium-67 passed the pre-clinic testing stage at the Kazakhstan Institute of Oncology and Radiology. The cyclotron facility also successfully produced and packaged cobalt-57 and cadmium-109

as sealed sources for research and industrial applications, and developed technology for the production of iodine-111 and iodine-123 for medical applications.

175. Five regional training courses were held under project RAW/6/010, 'Integration of Nuclear Medicine into the National Healthcare System', on the application of nuclear medicine techniques. Through these courses, more than 100 physicians and technologists in the Member States of West Asia received specialized training in the fields of cardiology, gated cardiac SPECT, and in vitro and in vivo radionuclide techniques to manage diabetes.

### **B.5.7 Industrial Applications**

176. Some Member States made further progress in the use of radiation technology for the improvement of industrial products, sterilization of medical and surgical goods, production of hydrogels for medical use, and radiation treatment of waste and industrial water for safe disposal or reuse. For example, at the electron beam accelerator facility at Yazd, **Islamic Republic of Iran**, initial trials to produce heat-shrinkable tubes were completed, and the radiation cross-linked tubes of up to 25 cm in diameter were manufactured successfully. In **Jordan**, the data collected under the project JOR/8/006, 'Pre-Feasibility Study for the Reuse of Wastewater through Radiation Processing', helped the national authorities decide on the next phase of scaling-up the application for a pilot-scale demonstration. The production and use of hydrogels for medical applications in **Kazakhstan** made further progress both in quantity and quality of the product.

## **B.6. Interregional**

177. The Interregional programme for 2002 was composed of 13 projects covering the following fields: food and agriculture, human health, nuclear instrumentation, nuclear power, radioactive waste management, and marine environment. Multiple regions are participating in the implementation of each project included in the programme, which represent an important and effective mechanism for the transfer of technologies and knowledge developed by a particular country or region to other countries and regions. Of particular interest in 2002, were the achievements made under interregional projects in Human Health and Food and Agriculture.

### **B.6.1 Human Health**

178. During 2002 the radiation and tissue banking programme was implemented in Africa (**Algeria, Egypt, Libyan Arab Jamahiriya, South Africa and Zambia**), East Asia and the Pacific (**Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Philippines, Singapore, Sri Lanka, Thailand and Vietnam**), Europe (**Poland, Slovakia and Ukraine**) and Latin America (**Argentina, Brazil, Chile, Cuba, Mexico, Peru and Uruguay**).

179. As was noted in Part A of this report, four MOUs were signed between the Agency and the Musculoskeletal Transplant Foundation, the National University of Singapore, the University of Buenos Aires and the National Atomic Energy Commission of Argentina, and Transplant Procurement Management, University of Barcelona, Spain. The purpose of these

memoranda is to strengthen further the Agency's training programme and public awareness campaigns by using counterpart facilities and expertise.

180. Some of these training courses will use the Internet as a means to transfer techniques and information to a wider audience. By working through the Internet, the programme will save several hundred thousands of dollars that can be used to support other important activities identified by the tissue banking community. Previously, all training activities were face-to-face involving expensive travel and accommodation. Now the opportunities can be expanded through the involvement of the participating partners.

181. During 2002, three main documents were prepared under the Agency's radiation and tissue banking projects to strengthen the quality of the work in the participating tissue banks. These documents, which are now in draft form, are the following: *International Standards for Tissue Banks*, the *Code of Practice for the Radiation Sterilization of Tissue Allografts*, and *Public Awareness Strategy for Tissue Banks*.

182. An achievement of the project in 2002 was the establishment of a close relationship between the Agency and the international tissue banking professional associations in East Asia and the Pacific, Europe, Latin America and USA. The presidents of these associations are now actively involved in the work of the Agency Technical Advisory Committee.

183. Distance-learning training courses continued to be carried out in the following regions: Africa (**Algeria, Morocco, South Africa, Tunisia and United Republic of Tanzania**); East Asia and the Pacific (**Bangladesh, China, India, Republic of Korea, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand**) and Latin America (**Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Panama, Peru and Venezuela**).

184. More than 400 students from these countries are participating in distance-learning training courses. The teaching materials developed by Australia in English have been translated into Spanish, French, Portuguese, Chinese, and Korean languages.

## **B.6.2 Food and Agriculture**

185. Interregional project INT/5/144, 'Sustainable Utilization of Saline Groundwater and Wastelands for Plant Productions', achieved results in the following countries: **Algeria, Egypt, Islamic Republic of Iran, Jordan, Morocco, Pakistan, Syrian Arab Republic, Tunisia** and the **United Arab Emirates**.

186. During 2002, the main objective of the project was to transfer technology to at least 10 farmers in each of the participating countries, with the purpose to convert wastelands into productive land.

187. Twenty demonstration sites covering an area of 441 ha of wastelands have been established in the participant countries, in which 63 different salt-tolerant plants are now growing using saline groundwater. The use of the technology has transformed these deserted areas into green ones. Two hundred and fifty-one farmers are now using this technology on their own farms. Some of them are growing salt-tolerant plants for feeding their animals. The animals are later sold in the market. Others are growing different salt-tolerant grains, which are used for feeding their own families. Due to the use of this technology in wastelands, the

farmers now working in the project have increased their incomes. The area of farmland (non-demonstration sites) covered by the project in all of the participant countries reached 582 ha.

188. As a result of the implementation of the project, seven countries have approved strategic documents containing actions to be taken by their governments, as well as plans to expand the results achieved to new areas and regions with the purpose to transform other deserted areas into productive land. These documents are being used by the governments of the participant countries and the Agency to guide actions in expanding the demonstration sites to cover more areas, to increase the number of salt-tolerant plants grown in the fields, to develop nurseries with the purpose to provide seeds to interested farmers, to identify new regions that can be included in the project, and to identify resources needed to expand the results achieved to other areas.

189. **Pakistan** is the leading country in the project. During 2002, the Pakistani Government approved \$3 million to expand, in the next five years, the results already achieved within the project to 30 000 ha of deserted land in four provinces of the country. An additional 480 000 ha could be included in the implementation of a national project prepared with the assistance of the Agency and strong participation of local communities, if additional resources are found.

190. The **Islamic Republic of Iran** has also decided to expand the results already achieved within the project to new areas and regions in three provinces of the country. To support this decision, the Government of Iran has decided to allocate \$300 000 to this endeavour. The Agency will support the preparation of a national project and a feasibility study responding to a request presented by the competent authorities of the country.

191. An MOU was signed between the Agency and the International Centre for Biosaline Agriculture in Dubai, **United Arab Emirates**, to promote the use of biosaline agriculture in interested countries and to use their facilities for training purposes.

## C. Resources and Delivery

### C.1. Overview

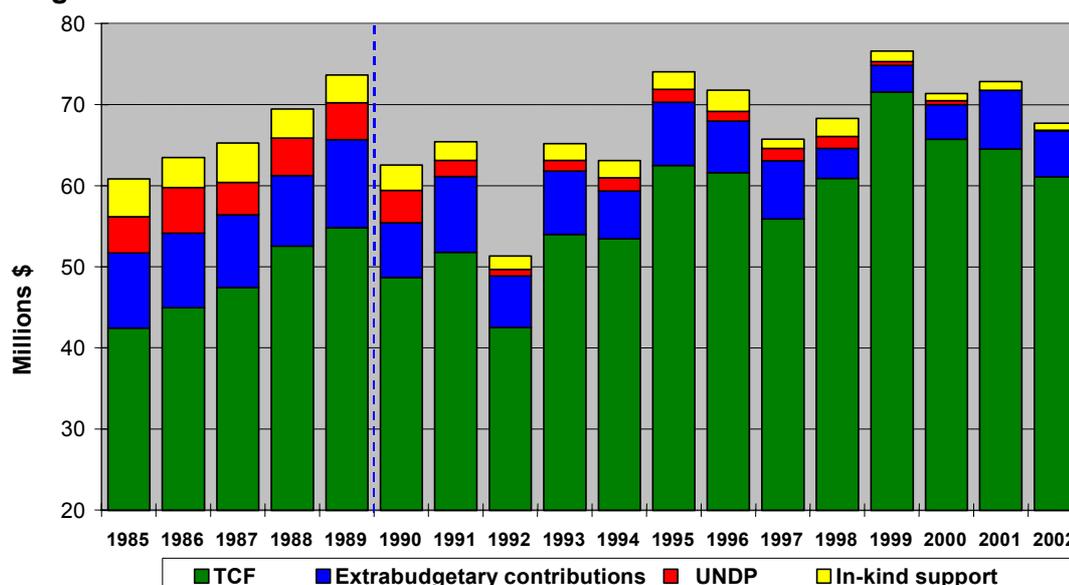
#### TECHNICAL CO-OPERATION PROGRAMME 2002 (as of 31 December 2002)

<b><i>New resources</i></b>	<b>\$67.7</b>	<b><i>million</i></b>
<b><i>Adjusted programme</i></b>	<b>\$98.1</b>	<b><i>million</i></b>
<b><i>New obligations</i></b>	<b>\$74.6</b>	<b><i>million</i></b>
<b><i>Disbursements</i></b>	<b>\$74.8</b>	<b><i>million</i></b>
<b><i>Implementation rate</i></b>	<b>76.1%</b>	

192. Resources for and delivery of the technical co-operation programme in 2002 reflected opposite trends. As mentioned in Part A of this report, resources were at their lowest level since 1998. However, in financial terms both the size of the technical co-operation programme and delivery during the year reached new highs.

193. New resources from all sources were down nearly 5% from \$71.1 million in 2001 to \$67.7 million in 2002. Only resources from the United Nations Development Programme (UNDP) showed an increase due to a new UNDP-funded project designed to reduce the impact of pollution and habitat degradation in the Dnieper River Basin. Figure 1 illustrates graphically that while technical co-operation resources grew consistently until 1989, the amount of available resources (adjusted for inflation) has had considerable fluctuations since 1990.

**Figure 1. IAEA TC RESOURCES ADJUSTED FOR INFLATION: 1986 – 2002\***

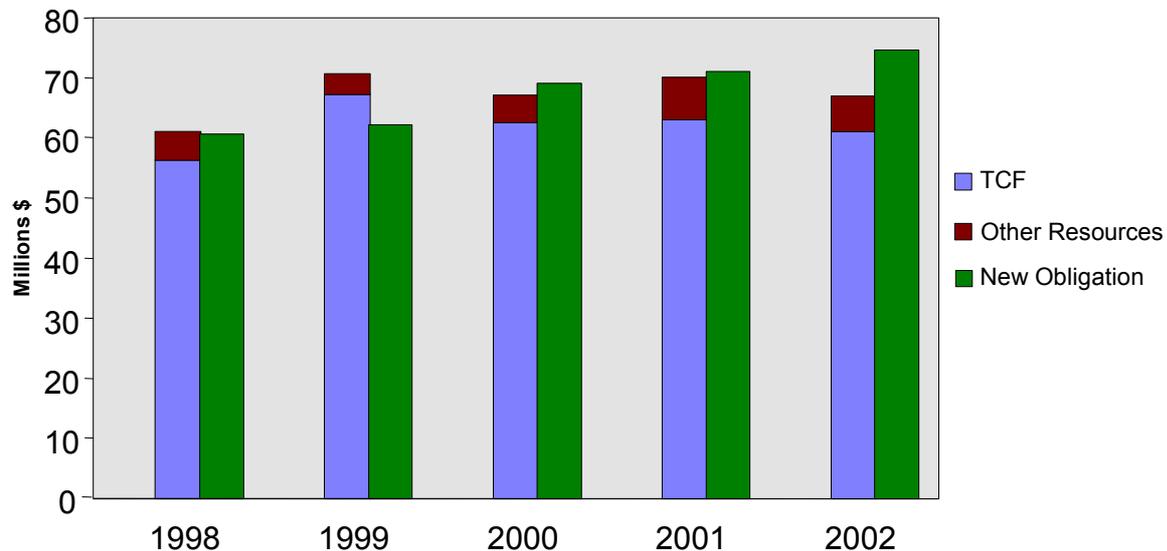


\* All figures prior to 2002 adjusted to 2002 dollars.

194. The size of the programme to be delivered and the actual delivery in financial terms showed continued growth. The total adjusted programme for 2002 rose to \$98.1 million, an increase of 3.5% over the 2001 level of \$94.7 million. During 2002, six footnote-a/ projects were made operational and 12 projects were approved for funding from the programming reserve provision under the Technical Co-operation Fund (TCF). An additional 31 projects received funding to upgrade approved footnote-a/ components. Over the course of 2002, one project was cancelled and 145 projects were completed. At the end of 2002, just over 700 projects were operational.

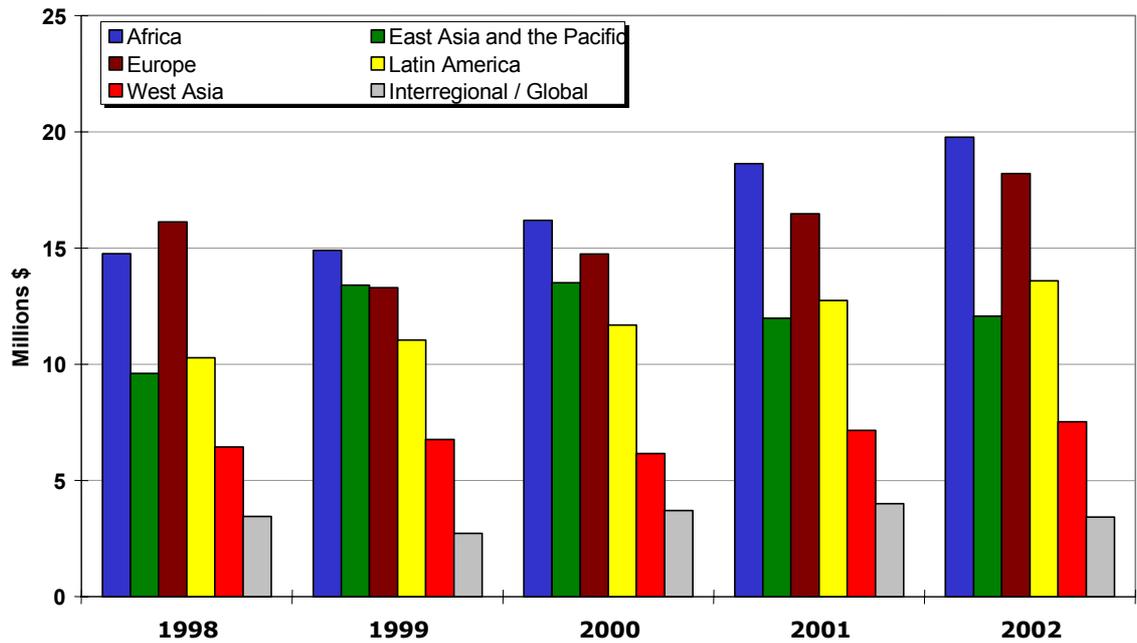
195. Delivery as measured in financial terms was also higher, with net new obligations of \$74.6 million by year end, up just over 5% from the 2001 figure of \$71.0 million. Disbursements also rose slightly to \$74.8 million, an increase of 1.8% over the \$73.5 million recorded in 2001. Figure 2 provides a comparison of new resources and new obligations over the past five years. In-kind amounts are not included in this figure.

**Figure 2. COMPARISON OF NEW RESOURCES WITH NEW OBLIGATIONS:  
1998 - 2002**



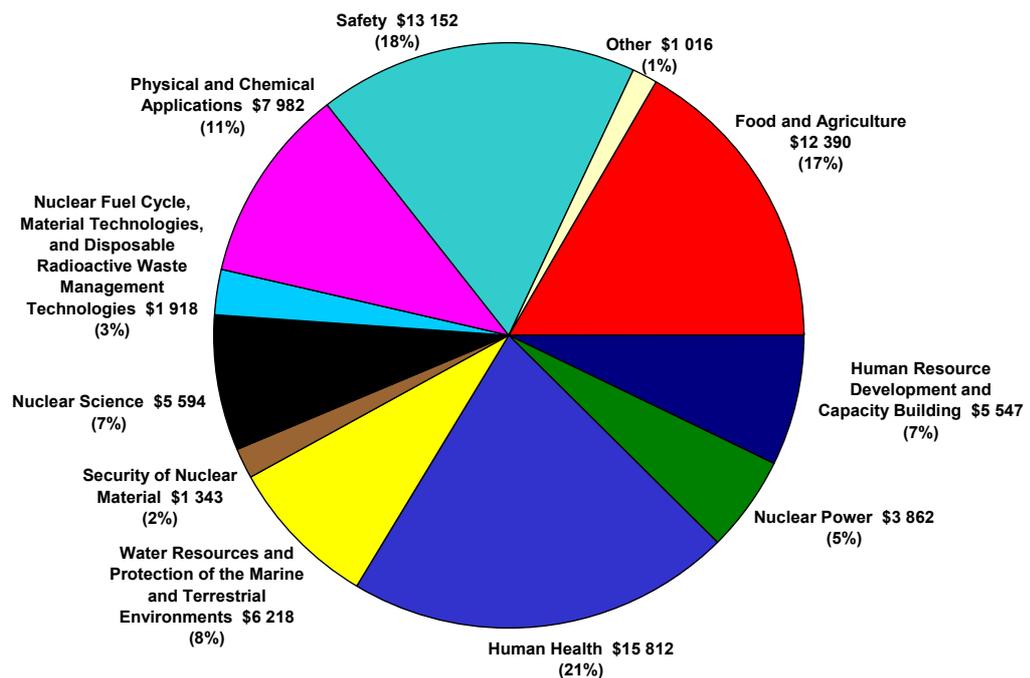
196. A further analysis of new obligations over the past five years is provided in Figure 3. The regional distribution remains similar to that of the last two years, with the largest shares reported in Africa and Europe.

**Figure 3. NEW OBLIGATIONS BY REGION: 1998 – 2002**



197. Figure 4 presents a summary of disbursements (including in-kind contributions) by Agency Programme. Human Health continued to account for the largest share (21%), down approximately 2% from 2001. Safety accounted for 18%, while 2% was disbursed for activities related to Nuclear Security. Disbursements for food and agriculture related projects amounted to 17% of the total.

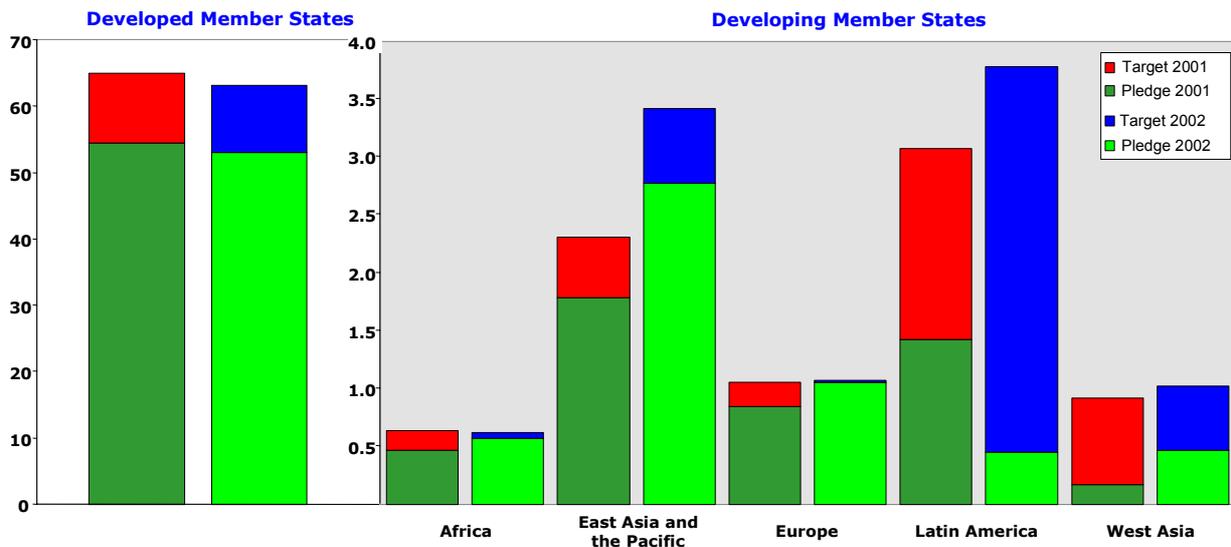
**Figure 4. DISTRIBUTION BY PROGRAMME: 2002  
(in thousands of dollars)**



## C.2. Technical Co-operation Fund

198. As already discussed in Part A, resources for the TCF were down from the levels of previous years. The target of \$73.0 million remained the same as that for 2001. However, pledges as of 31 December stood at \$58.3 million, down from \$59.2 million at 31 December 2001, and payments against those pledges reached \$57.5 million in 2002 as compared with \$58.0 million in 2001. Figure 5 shows a breakdown of the assessment and pledging profile by region for 2001 and 2002. As a result of the change in assessment rates, developed countries and the Africa region were responsible for smaller shares of the target, while the shares for East Asia and the Pacific, Europe, Latin America and West Asia all increased. Pledges by developed countries were down, in line with the decrease in assessment rate. Pledging increased for all other regions except Latin America, which was down significantly despite the rise in target share. The net result was a decrease in pledges of \$0.9 million from the 2001 level.

**Figure 5. COMPARISON OF TARGET SHARE AND PLEDGES: 2001 AND 2002**  
 (in millions of dollars)



199. Table 1 shows payments to the TCF for 2002, listing the payments made by the 20 Member States contributing the largest amounts. They accounted for some 94.9% of total payments to the TCF.

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

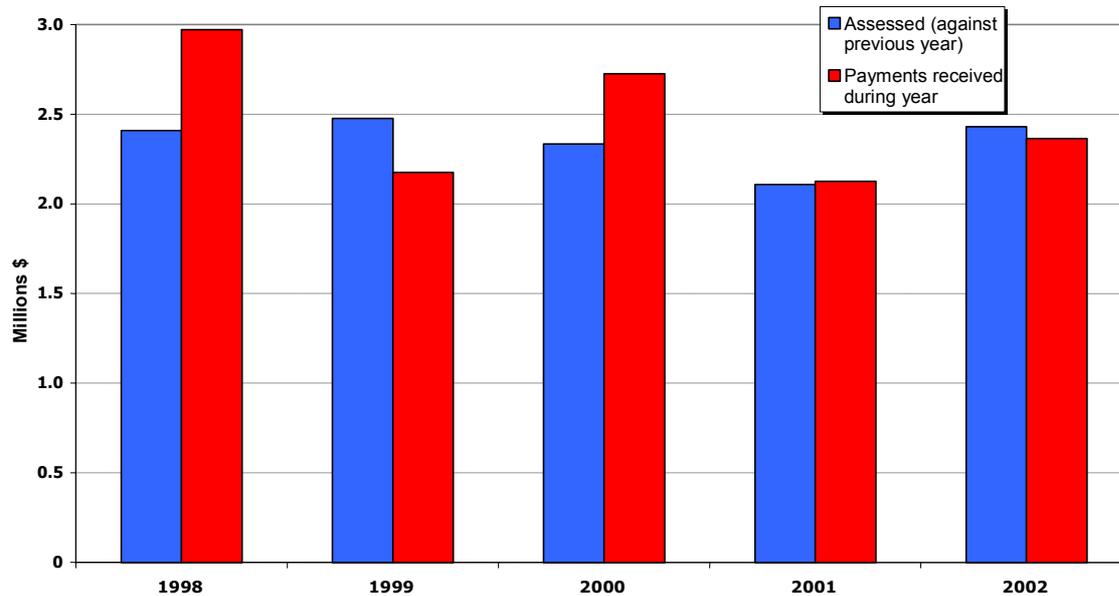
Member State	Payments	Payment as percentage of share	Payment as percentage of total payments
United States of America	17 919 212	98.2%	30.7%
Japan	13 602 820	100.0%	23.3%
France	4 506 290	100.0%	7.7%
Germany	4 425 662	65.0%	7.6%
United Kingdom of Great Britain	3 858 780	100.0%	6.6%
Canada	1 471 698	82.6%	2.5%
Netherlands	1 211 070	100.0%	2.1%
China	1 067 990	100.0%	1.8%
Switzerland	838 365	95.0%	1.4%
Russian Federation*	799 621	96.2%	1.4%
Australia	785 714	69.3%	1.3%
Korea, Republic of	720 000	60.1%	1.2%
Sweden	716 130	100.0%	1.2%
Austria	659 920	100.0%	1.1%
Denmark	521 950	100.0%	0.9%
Spain	519 372	29.6%	0.9%
Norway	450 410	100.0%	0.8%
Finland	363 540	100.0%	0.6%
Greece	337 667	90.0%	0.6%
Turkey	307 330	100.0%	0.5%
<b>Subtotal</b>	<b>55 083 541</b>	<b>91.4%</b>	<b>94.5%</b>
Others	3 229 149	25.3%	5.5%
<b>Total</b>	<b>58 312 690</b>	<b>79.9%</b>	<b>100.0%</b>

\*Payment reported to the Agency only in 2003, though made in 2002.

200. After two years in which payments of assessed programme costs (APCs) exceeded the amount billed, 2002 ended with the amount paid (\$2 363 301) slightly less than the amount assessed (\$2 430 140), leading to an increase in the outstanding arrears. As of the end of 2002, total arrears stood at \$7.1 million.

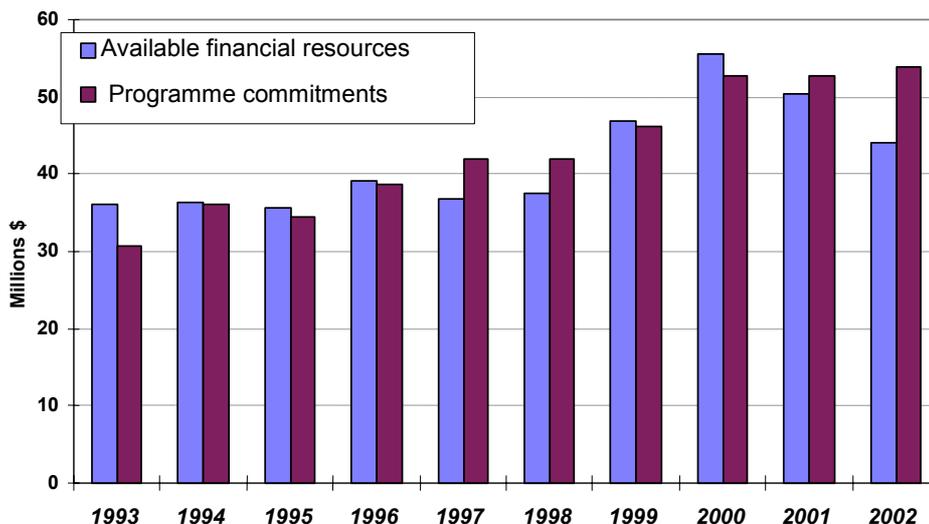
201. Several Member States have explored the possibility of setting up a formal payment plan for APC arrears, and three Member States have actually entered into a formal agreement with the Agency as of 31 December 2002.

**Figure 6. ASSESSED PROGRAMME COSTS**  
**Annual Assessment and Total Payments Received – 1998 to 2002**



202. ‘Overprogramming’ is 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. In 2002, the combination of lower than expected resources and a larger programme than in previous years led to an overprogramming level of \$9.8 million, or 12.5% at the end of the year. Figure 7 below provides an overview of the relation between resources and programme commitments over the past ten years. Because 12.5% is a relatively high level, the Secretariat will carefully monitor the programme and projected new resources in 2003 to assure that programming levels are prudent.

**Figure 7. TCF RESOURCES AVAILABLE AND PROGRAMME COMMITMENTS**  
**(as of 31 December 2002)**



203. In the past three years, the size of the unobligated balance at year's end was cause for concern. In 2002, the combination of lower resources and higher new obligations has led to a substantial reduction in the unobligated balance. Table 2 gives an overview of the makeup of the unobligated balance over the past five years. This reduction in 2002 was seen not only in the total unobligated balance but also in the useable portion of that balance. At the end of 2002, obligations against future-year resources stood at \$1.8 million, effectively utilizing the useable unobligated balance carried forward into 2003. The amount of those currencies which cannot be used, or which can only be used with difficulty, grew by 4%, continuing the trend of the previous two years. The Secretariat continues to work with Member States and with UNDP to find ways in which these difficult currencies can be used.

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

	1998	1999	2000	2001	2002
Unobligated balance at year end	10 161 000	18 403 000	19 901 000	17 131 000	9 968 000
Pledges not yet paid	(2 400 000)	(2 877 000)	(6 894 000)	(2 704 000)	(2 882 000)
Non-convertible currencies which cannot be used	(1 706 000)	(1 495 000)	(1 631 000)	(1 878 000)	(1 162 000)
Currencies which are difficult to convert and can only be used slowly	(2 611 000)	(2 335 000)	(3 281 000)	(3 468 000)	(4 382 000)
Resources which can be used for technical co-operation programme obligations	3 444 000	11 696 000	8 095 000	9 081 000	1 542 000

### C.3. Extrabudgetary Contributions

204. Extrabudgetary contributions also showed a decline in 2002 with new resources totalling \$5.8 million, down from \$7 million in 2001. However, it is expected that this trend will be reversed in 2003. The Nuclear Threat Initiative (NTI) made an initial contribution of \$500 000 in 2002 to begin funding of a large effort to decommission the research reactor at the Vinča Institute of Nuclear Sciences in Serbia and Montenegro. Funding from the NTI for this undertaking is expected to reach a total of \$5 million over the next several years.

205. First co-operative efforts were made to implement activities using the Nuclear Security Fund (NSF) with a training course on physical protection and security of nuclear materials held at Argonne National Laboratory, USA, in the fourth quarter of 2002. In response to Board recommendations that technical co-operation experience be used to efficiently implement activities in the area of nuclear security, it is expected that a number of additional activities will be implemented using NSF resources in 2003. Implementation by the Agency using these funds is reported in this document within the extrabudgetary

category. However, a full report on the use of these funds will be in separate documents relating specifically to the NSF.

206. Several traditional extrabudgetary donors continued to provide significant funding in 2002. France provided just over \$220 000 to support projects using several nuclear technologies in three different regions. Japan contributed \$300 000 in 2002, continuing its strong support for various projects being implemented in the framework of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology for East Asia and the Pacific (RCA). The OPEC Fund for International Development provided additional funding of just over \$125 000 for two projects in Africa and one in East Asia and the Pacific. The United States provided new funds in the amount of \$1.3 million to support a number of projects in nuclear safety, nuclear security, agriculture and general development aimed specifically at least developed countries in Africa.

#### **C.4. In-Kind Support**

207. In-kind support for technical co-operation project implementation represents a small total amount but provides important inputs for the implementation of the technical co-operation programme. Member States are given credit as in-kind donors for the provision of the following types of support: providing expert and training course lecturer services fully or partially cost-free in countries other than their own; sponsoring foreign training course participants; providing full or partially cost-free fellowship training (type II fellowships); and donating equipment that is received by another Member State.

208. A total of just over \$835 000 worth of in-kind support<sup>2</sup> was provided by 72 Member States and 6 international organizations. Nearly half of this assistance was related to provision of expert and lecturer services. Provision of full or partial funding for fellows and scientific visitors accounted for 22% of total in-kind support, and the provision of costs for training course or meeting participants and for equipment each accounted for approximately 10% of this type of funding.

#### **C.5. Delivery of Outputs**

209. The successful implementation of any project depends on teamwork on the part of the recipient country, the Secretariat, and very often a supplier or donor country. Donor countries participate in the technical co-operation programme in an essential way through the provision of expert services, training facilities and goods purchased by the Agency to implement the technical co-operation programme. Good co-ordination and contact between all the stakeholders is important. They can be facilitated through new means of communication such as electronic correspondence and enhanced computerized systems as well as traditional means of contact.

210. International political factors influence considerably the delivery of outputs and have required a considerable amount of extra effort with regard to rescheduling expert

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<sup>2</sup> Because of the nature of in-kind support, the monetary value is only an estimate.

missions, cancelling and relocating training, and shipping certain types of equipment. Visas are more difficult to obtain; experts are often reluctant to travel to some regions and countries due to security concerns, and some Member States are reluctant to host trainees from certain countries, making it more difficult to place fellows and scientific visitors. In addition, national embargoes and restrictive export policies sometimes prevent the ideal equipment from being delivered. All of this affects the timely implementation of some activities and increases the workload of the Secretariat.

211. The following paragraphs report on the quantifiable inputs supplied and outputs delivered under the technical co-operation programme for 2002. 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.

### C.5.1 Experts, Meetings and Workshops

212. The total number of assignments fielded in 2002 was 6707, a decrease of 2.2% from 2001. These assignments include the following: international experts, training course lecturers, national experts, meeting and workshop participants, and other project personnel (such as technical and support staff). Table 3 shows the evolution of the expert, meeting and workshop component over the last five years.

**Table 3. EXPERTS, LECTURERS AND MEETING/WORKSHOP PARTICIPANTS:  
1998 – 2002**

Year	New obligations (millions \$)	Persons	Total assignments	Number of assignments				
				International experts	Lecturers	National experts	Meeting/ Workshop participants	Other project personnel
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
2002	18.7	4 346	6 707	2 817	534	606	2 713	37

213. One of the objectives of the technical co-operation programme is to promote technical co-operation among developing countries. As an indicator of co-operation between countries within the same geographical region, the share of assignments carried out in 2002 by professionals from a given region to another country in the same region was as follows: Africa, 36%; East Asia and the Pacific, 47%; Europe, 81%; Latin America, 59%; and West Asia, 7%.

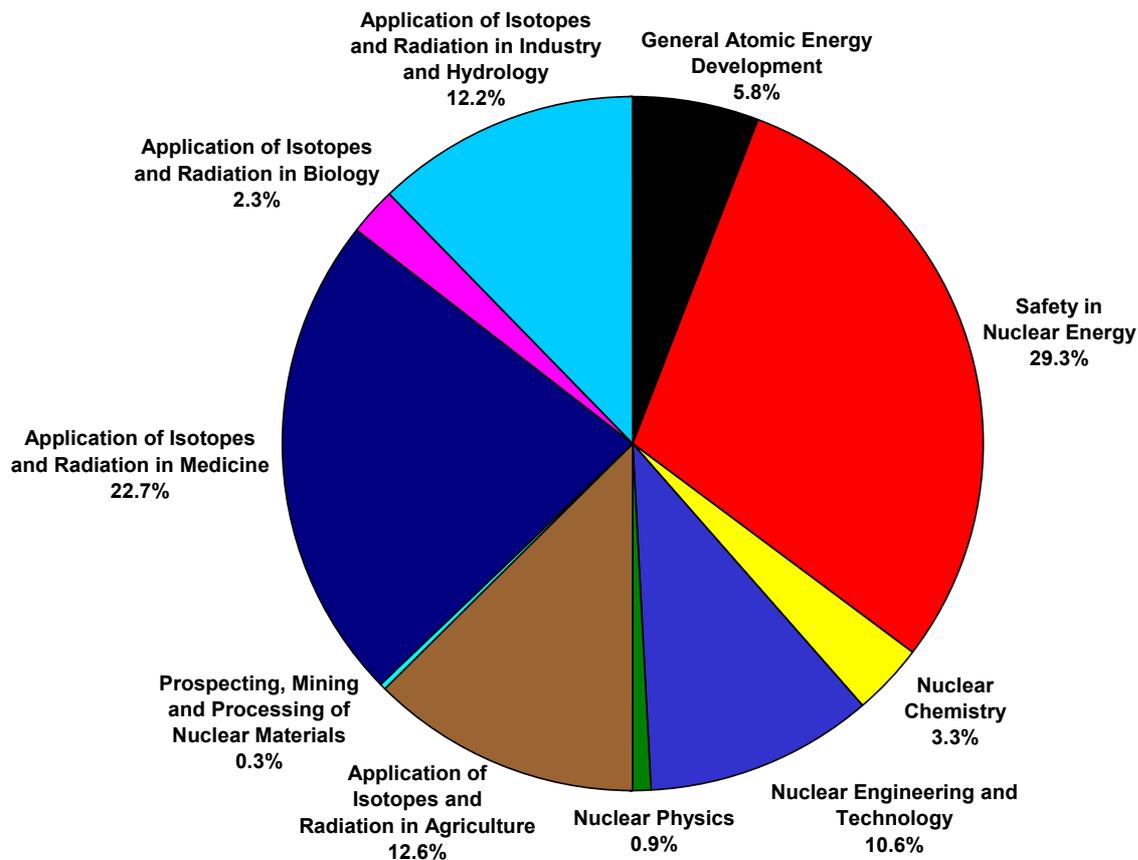
214. Details on the countries and regions that received the assignments, and on the origin of the individuals who undertook the assignments, are given in Tables C.1 and C.2, respectively, of the Supplement to this report.

### C.5.2 Technical Co-operation Trainees

215. In 2002, 1632 persons received training as fellows and scientific visitors, and 2398 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.

216. Figure 8 below shows that the principal fields of activity in which training was provided were Safety in Nuclear Energy with 29% and Medical Applications with 23%.

**Figure 8. TRAINING BY FIELD OF ACTIVITY: 2002**



217. Despite difficulties in the placement process, the number of fellows and scientific visitors in the field, compared with last year, grew by 7.7% from 1516 to 1632. The number of training course participants grew by 6.1% from 2260 to 2398; also the number of training courses increased from 146 to 172.

218. All of the 172 regional and interregional training courses held in 2002 took place within the framework of technical co-operation projects, as has been the case since 2001. Nine of the training courses were planned at the interregional level, and 163 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: 26 under the RCA, 19 under the ARCAL activities, and 28 under the AFRA programme.

219. The fellowship component plays a significant role in the technical co-operation programme, enabling people in the recipient countries to keep up with the knowledge of nuclear techniques. 'Knowledge management' is a growing concern among many Member States. It is important that Member States assure appropriate use of the knowledge gained from various courses of study provided through the technical co-operation programme by assuring that fellows return to their same or a higher post upon successful completion of their training. In order to facilitate the placement process, nominating countries must ensure that the fellowship nomination form is fully completed and the language proficiency of the candidate be adequate for the candidate to benefit from the requested training. Unfortunately, placement of fellows and scientific visitors is difficult in some countries with excellent training facilities, but with costly tuition fees.

220. Table 4 provides a summary of training provided over the last five years.

**Table 4. TECHNICAL CO-OPERATION TRAINEES: 1998 – 2002**

Year	Fellowships/Scientific Visits		Training Courses		
	New obligations (millions \$)	Number of fellows/scientific visitors	New obligations (millions \$)	Number of courses	Number of participants
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
2002	10.1	1 632	9.2	172	2 398

221. Twenty-two fellows received a total of 50 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 \$182 748, which was contributed by three Member States.

**Table 5. IN-KIND SUPPORT FOR FELLOWSHIPS: 2002**

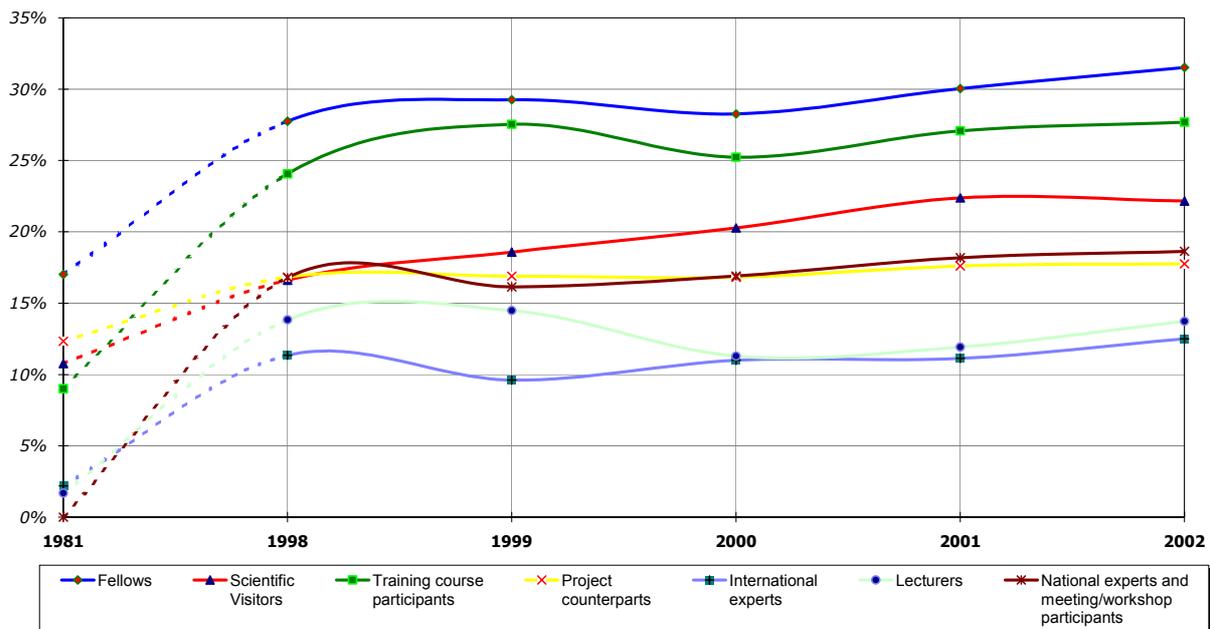
Donor	Number of fellows in the field	Number of months of training	Monetary value (\$)
Egypt	1	2	5 228
Spain	3	9	14 560
United States of America	18	39	162 960
TOTAL	22	50	182 748

### C.5.3 Women’s Participation in the Technical Co-operation Programme

222. The Department of Technical Co-operation welcomed Ms. Ana María Cetto as its new Deputy Director General in January 2003. She is the first woman appointed to the level of Deputy Director General in the Agency’s 45 year history.

223. The Agency encourages women to participate in all aspects of the technical co-operation programme. Figure 9 provides a graphic presentation of how women participate in the programme, including serving as experts, lecturers or project counterparts, participating in meetings, workshops or training courses or receiving more individual training as fellows or scientific visitors. In comparison with the base year 1981, when women represented 10.9% of the total participants in all categories, women’s participation increased to 20.9% in 2002. 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.

**Figure 9: PARTICIPATION OF WOMEN IN THE TECHNICAL CO-OPERATION PROGRAMME BY TYPE OF ASSIGNMENT: 1998 – 2002**



### C.5.4 Equipment and Supplies

224. As shown in Table 6, the number of purchase orders in 2002 was 3794, which was 14.4% less than in 2001. The value of new obligations was also down slightly to \$31.7 million. However, disbursements for equipment and supplies increased by \$2.3 million and represented 43% of disbursements for all components under the technical co-operation programme.

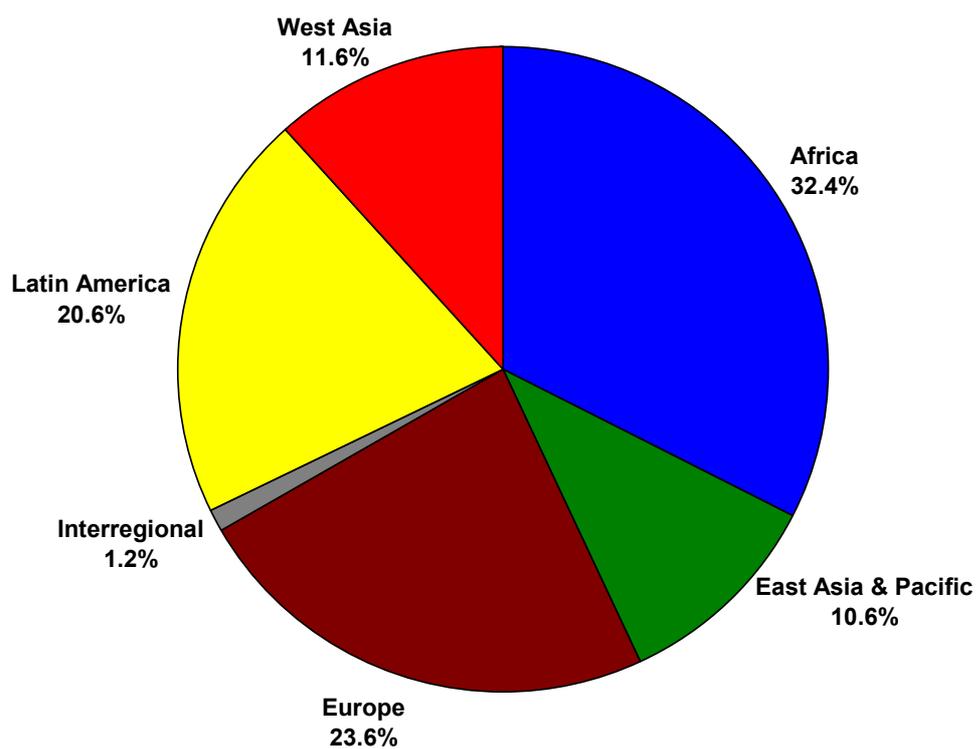
**Table 6. EQUIPMENT AND SUPPLIES: 1998 – 2002**

Year	New obligations (millions \$)	Disbursements (millions \$)	Number of purchase orders *
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
2002	31.7	32.2	3 794

\* Including training course equipment and research contract orders.

225. Figure 10 shows the breakdown of disbursements for equipment by the region to which the equipment was delivered. The largest regional share in disbursements for equipment in 2002 was for the Africa programme, representing 32.4% of the total, followed by Europe, with 23.6% and Latin America with 20.6%.

**Figure 10. EQUIPMENT DISBURSEMENTS BY REGION: 2002**



226. 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. In line with the relevant United Nations resolutions, efforts were continued to increase procurement from developing countries. The value of such procurement increased slightly from \$4.4 million in 2001 to \$4.6 million in 2002. The five Member States representing the largest portion of procurement from recipient Member States were China, Guatemala, Hungary, Republic of Korea and South Africa.

227. In compliance with recommendations by the Board of Governors, the Secretariat introduced tighter controls for the procurement of radioactive material. The Regional Managers for Radiation Protection and the Radiation Health and Safety Officers must clear both stand-alone sources and sources incorporated into equipment.

## Implementation Summary As of 31 December 2002

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
<b>Africa</b>			
Algeria	826 149.41	604 587.26	221 562.15
Angola	131 121.63	85 017.58	46 104.05
Burkina Faso	223 002.81	192 395.08	30 607.73
Cameroon	220 485.21	133 201.56	87 283.65
Côte d'Ivoire	142 434.14	117 903.74	24 530.40
Democratic Republic of the Congo	202 837.91	185 507.19	17 330.72
Egypt	938 682.92	643 753.74	294 929.18
Eritrea	686.27	0.00	686.27
Ethiopia	1 081 580.80	742 273.12	339 307.68
Gabon	165 528.98	52 877.45	112 651.53
Ghana	254 866.01	202 216.91	52 649.10
Kenya	221 972.94	171 877.27	50 095.67
Libyan Arab Jamahiriya	291 202.05	241 626.53	49 575.52
Madagascar	106 844.75	83 330.38	23 514.37
Mali	261 649.93	255 486.08	6 163.85
Mauritius	203 823.85	166 794.16	37 029.69
Morocco	881 566.71	666 295.99	215 270.72
Namibia	270 776.51	157 684.62	113 091.89
Niger	294 198.39	244 573.32	49 625.07
Nigeria	496 498.17	401 902.33	94 595.84
Senegal	149 957.52	141 881.06	8 076.46
Sierra Leone	109 094.45	77 722.78	31 371.67
South Africa	641 841.59	495 976.52	145 865.07
Sudan	512 177.79	356 329.21	155 848.58
Tunisia	521 838.64	423 548.69	98 289.95
Uganda	604 558.70	485 342.27	119 216.43
United Republic of Tanzania	880 771.89	710 768.75	170 003.14
Zambia	227 877.11	136 717.34	91 159.77
Zimbabwe	507 855.63	430 664.13	77 191.50
Regional Africa	13 143 158.83	11 165 094.31	1 978 064.52
<b>Regional Total</b>	<b>24 515 041.54</b>	<b>19 773 349.37</b>	<b>4 741 692.17</b>

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
<b>East Asia and the Pacific</b>			
Bangladesh	907 878.64	476 765.27	431 113.37
China	1 498 950.24	603 753.22	895 197.02
Indonesia	509 286.58	320 227.57	189 059.01
Korea, Republic of	662,526.88	317,313.53	345,213.35
Malaysia	621 267.46	380 418.02	240 849.44
Marshall Islands	69.42	0.00	69.42
Mongolia	566 355.63	471 166.52	95 189.11
Myanmar	326 425.04	184 086.45	142 338.59
Pakistan	2 151 711.54	1 680 137.11	471 574.43
Philippines	460 359.54	343 211.41	117 148.13
Singapore	23 120.22	24 992.49	-1 872.27
Sri Lanka	910 717.26	703 284.30	207 432.96
Thailand	704 987.34	519 318.94	185 668.40
Vietnam	1 424 330.38	1 134 896.69	289 433.69
Regional East Asia and the Pacific	7 776 253.48	4 903 713.69	2 872 539.79
<b>Regional Total</b>	<b>18 544 239.65</b>	<b>12 063 285.21</b>	<b>6 480 954.44</b>
<b>Europe</b>			
Albania	315 031.45	245 693.01	69 338.44
Armenia	1 064 200.56	938 157.69	126 042.87
Azerbaijan	134 959.29	87 939.95	47 019.34
Belarus	555 152.85	427 944.07	127 208.78
Bosnia and Herzegovina	231 099.48	161 166.97	69 932.51
Bulgaria	1 613 534.12	1 390 620.59	222 913.53
Croatia	650 844.05	543 709.04	107 135.01
Cyprus	42 651.37	34 994.34	7 657.03
Czech Republic	568 547.21	460 351.52	108 195.69
Estonia	54 972.04	54 585.71	386.33
Georgia	386 475.26	299 579.58	86 895.68
Greece	208 220.26	207 079.69	1 140.57
Hungary	618 542.81	559 568.82	58 973.99
Latvia	347 458.18	272 515.16	74 943.02
Lithuania	457 953.81	338 697.57	119 256.24
Malta	172 088.26	112 627.80	59 460.46

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
Poland	1 785 586.78	1 576 232.30	209 354.48
Portugal	30 983.09	27 624.40	3 358.69
Republic of Moldova	373 566.97	359 896.73	13 670.24
Romania	498 819.13	453 342.23	45 476.90
Russian Federation	161 880.29	70 931.65	90 948.64
Slovakia	588 969.28	541 791.54	47 177.74
Slovenia	96 335.16	95 246.07	1 089.09
The Former Yugoslav Republic of Macedonia	449 297.71	301 797.87	147 499.84
Turkey	392 534.39	211 367.51	181 166.88
Ukraine	1 114 875.22	885 654.38	229 220.84
Yugoslavia, Federal Republic of <sup>3</sup>	546,803.77	462,154.62	84,649.15
Regional Europe	8 948 827.17	7 088 267.50	1 860 559.67
<b>Regional Total</b>	<b>22 410 209.96</b>	<b>18 209 538.31</b>	<b>4 200 671.65</b>
<b>Latin America</b>			
Argentina	540 180.59	459 418.76	80 761.83
Bolivia	590 346.74	535 990.39	54 356.35
Brazil	1 739 646.26	1 555 536.20	184 110.06
Chile	662 351.79	463 653.69	198 698.10
Colombia	211 821.52	181 636.23	30 185.29
Costa Rica	279 975.56	226 758.24	53 217.32
Cuba	791 168.95	698 973.19	92 195.76
Dominican Republic	-3 595.85	-3 595.85	0.00
Ecuador	732 745.09	343 773.85	388 971.24
El Salvador	267 479.92	81 717.52	185 762.40
Guatemala	55 738.76	45 656.78	10 081.98
Haiti	50 000.00	7 600.41	42 399.59
Jamaica	448 736.67	385 983.31	62 753.36
Mexico	648 926.80	539 947.93	108 978.87
Nicaragua	257 871.69	37 410.29	220 461.40
Panama	79 317.86	61 516.23	17 801.63
Paraguay	28 599.62	28 599.62	0.00

<sup>3</sup> The Agency recognizes that as of 4 February 2003, the Federal Republic of Yugoslavia officially changed its name to Serbia and Montenegro.

Recipient	Adjusted programme (\$)	New obligations (\$)	Earmarkings (\$)
Peru	683 853.81	600 975.20	82 878.61
Uruguay	359 664.15	304 320.02	55 344.13
Venezuela	322 334.84	135 592.89	186 741.95
Regional Latin America	8 658 687.59	6 892 225.37	1 766 462.22
<b>Regional Total</b>	<b>17 405 852.36</b>	<b>13 583 690.27</b>	<b>3 822 162.09</b>
<b>West Asia</b>			
Iran, Islamic Republic of	1,861,106.95	1,429,790.01	431,316.94
Iraq	136 425.95	-1 754.05	138 180.00
Israel	532 323.64	366 840.95	165 482.69
Jordan	840 813.71	558 104.20	282 709.51
Kazakhstan	611 568.51	458 650.52	152 917.99
Kuwait	160 483.51	117 590.82	42 892.69
Lebanon	62 756.68	30 566.30	32 190.38
Saudi Arabia	126 126.48	56 740.97	69 385.51
Syrian Arab Republic	1 193 419.83	968 486.00	224 933.83
Territories under the jurisdiction of the Palestinian Authority	676 431.15	183 683.71	492 747.44
United Arab Emirates	52 830.45	25 404.16	27 426.29
Uzbekistan	288 080.29	204 263.67	83 816.62
Yemen	593 880.23	338 741.78	255 138.45
Regional West Asia	3 031 390.32	2 792 783.00	238 607.32
<b>Regional Total</b>	<b>10 167 637.70</b>	<b>7 529 892.04</b>	<b>2 637 745.66</b>
Global	1 668 042.16	696 713.84	971 328.32
Interregional	3 340 471.73	2 736 361.26	604 110.47
<b>Overall Total</b>	<b>98 051 495.10</b>	<b>74 592 830.30</b>	<b>23 458 664.80</b>

## Abbreviations and Acronyms

<b>ADB</b>	Asian Development Bank
<b>AFRA</b>	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
<b>ALARA</b>	As low as reasonably achievable
<b>APC</b>	Assessed programme costs
<b>ARASIA</b>	Co-operative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology
<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>BSS</b>	International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources
<b>BWR</b>	Boiling water reactor
<b>CEE</b>	Central and Eastern Europe
<b>CFC</b>	Common Fund for Commodities
<b>CHT</b>	Congenital hypothyroidism
<b>CNEN</b>	Comissão Nacional de Energia Nuclear - National Nuclear Energy Commission (Brazil)
<b>CNESTEN</b>	Centre National de l'Énergie, des Sciences et des Techniques Nucléaires - National Centre for Nuclear Energy, Sciences, and Technology (Morocco)
<b>CO</b>	Country officer
<b>CPF</b>	Country Programme Framework
<b>CZM</b>	Coastal Zone Management
<b>DU</b>	Depleted uranium
<b>EC</b>	European Commission
<b>EU</b>	European Union
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FNCA</b>	Forum for Nuclear Cooperation in Asia
<b>GC</b>	General Conference
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Greenhouse gas
<b>GIS</b>	Geographical information system
<b>GREP</b>	Global Rinderpest Eradication Programme
<b>IAEA</b>	International Atomic Energy Agency
<b>ICBA</b>	International Centre for Bio-saline Agriculture (UAE)
<b>INSARR</b>	Integrated Safety Assessment of Research Reactors

<b>IPEN</b>	Nuclear and Energy Research Institute (Brazil)
<b>IPSART</b>	International Probabilistic Safety Assessment Review Team
<b>IRRT</b>	International Regulatory Review Team
<b>ISO</b>	International Organization for Standardization
<b>JICA</b>	Japan International Cooperation Agency
<b>LDC</b>	Least developed country
<b>MAED</b>	Model for Analysis of Energy Demand (IAEA software)
<b>MOU</b>	Memorandum of Understanding
<b>MTBF</b>	Department of Management, Division of Budget and Finance
<b>MTF</b>	Musculo-skeletal Transplant Foundation
<b>NDT</b>	Non-destructive testing
<b>NGO</b>	Non-governmental organization
<b>NLO</b>	National Liaison Officer
<b>NPP</b>	Nuclear power plant
<b>OIE</b>	Organisation Internationale des Epizooties
<b>ORCI</b>	Ocean Road Cancer Institute
<b>OSART</b>	Operational Safety Review Team
<b>PATTEC</b>	Pan African Tsetse and Trypanosomosis Eradication Campaign
<b>PCR</b>	Polymerase chain reaction
<b>PET</b>	Positron emission tomography
<b>PGNAA</b>	Prompt gamma neutron activation 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>RBA</b>	Receptor binding assay
<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>SAGTAC</b>	Standing Advisory Group on Technical Assistance and Co-operation

<b>SAR</b>	Safety Analysis Report
<b>SAT</b>	Sequential aerosol technique
<b>SIT</b>	Sterile insect technique
<b>SPECT</b>	Single photon emission computed tomography
<b>TB</b>	Tuberculosis
<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>TLD</b>	Thermoluminescent dosimetry
<b>TO</b>	Technical Officer
<b>UMMB</b>	Urea molasses multnutrient blocks
<b>UN</b>	United Nations
<b>UNAIDS</b>	Joint United Nations Programme on HIV/AIDS
<b>UNDAF</b>	United Nations Development Assistance Framework
<b>UNDP</b>	United Nations Development Programme
<b>UNEP</b>	United Nations Environment Programme
<b>UNESCAP</b>	United Nations Economic and Social Commission for Asia and the Pacific
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>UNCEF</b>	United Nations Children's Fund
<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>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

**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 can be shown that it is in an area of national priority that enjoys strong government support. This means that:

- a) It is clearly related to a core competency of the Agency (i.e. it is safety related or deals with nuclear power operations or radioactive waste management) and it has a good chance of achieving its expected result; or,
- b) It is in an area where there is a national programme enjoying strong government commitment with evidence of significant financial support.

**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 regional 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.