

Technical Cooperation Report for 2008

Report by the Director General



IAEA

International Atomic Energy Agency

**TECHNICAL
COOPERATION REPORT
FOR 2008**

REPORT BY THE DIRECTOR GENERAL

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PREFACE

The Board of Governors has requested the transmission to the General Conference of the attached Technical Cooperation Report for 2008, the draft of which was considered by the Board at its June 2009 session.

The Director General is also hereby reporting in fulfilment of the request contained in resolution GC(52)/RES/11 on “Strengthening of the Agency’s technical cooperation activities”.

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Summary

This year's Technical Cooperation (TC) Report is built around the theme 'Technical Cooperation: A shared responsibility'. The IAEA's technical cooperation programme is the result of the combined efforts of the Member States and the Secretariat. Without the input of all stakeholder groups, the programme could not exist. Cohesive technical, financial, administrative and managerial contributions are combined to create and implement a programme that applies nuclear science and technology to address the pressing developmental and socioeconomic needs identified by the Member States themselves. Efforts to target and deliver IAEA technical cooperation are strengthened by effective Country Programme Frameworks.

Part A of this document focuses on an overview of technical cooperation activities from 1 April 2008 to 31 March 2009. In 2008, the Department of Technical Cooperation made a sustained effort to build relationships with other United Nations system organizations at every level, including initial participation in the United Nations Development Assistance Framework process. Partnerships with a range of appropriate bilateral and multilateral partners were also pursued to strengthen the TC programme in support of key socioeconomic areas, and to enable the Agency to contribute its specialized expertise to large scale activities.

In Latin America, for example, in cooperation with the Latin American Energy Organization (OLADE), the Agency has provided advice and training on energy planning for sustainable development to 18 countries. In Africa, partnerships with United Nations Development Programme/Global Environment Facility (UNDP/GEF) are supporting the management of the Nubian Aquifer and the Nile River Basin, while in Asia and the Pacific, the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia

and the Pacific (RCA) initiated actions to establish cooperation with the Clean Air Initiative for Asia, the Partnership for the Environmental Management of the Seas of South Asia, the Asian Regional Cooperative Council for Nuclear Medicine and UNDP.

Cooperation between Member States – in particular, Technical Cooperation among Developing Countries (TCDC) – played an increasingly important role in 2008, and the presence of strategic cooperative frameworks in each region had a markedly positive effect on the preparation of the 2009–2011 TC cycle. Member States in the Europe region recognized regional cooperation as the best mechanism to promote effective and open exchange of know-how and experience, and are moving towards the preparation of a regional technical cooperation strategy. In Africa, the TCDC modality was used throughout the region in 2008, particularly in the activities of the African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA). Emphasis was given to the development of human resources using African resource institutions.

A range of activities were carried out through 2008 to strengthen the TC programme. Significant efforts were made to ensure that the established criteria for relevance, ownership, commitment and sustainability were met during the planning of the 2009–2011 cycle, and the IT applications used in the implementation of the programme were further developed. The Programme Cycle Management Framework (PCMF) IT platform proved its value as the central mode for communication between Member States and the Secretariat during the programme development cycle. The system has been further enhanced to support monitoring and reporting, focusing on the collection of outcome level information from the counterpart.

Part B of this document presents a summary of indicators, reviewing mobilization of resources for TC through the Technical Cooperation Fund (TCF), and presenting extrabudgetary and in-kind contributions. Programme delivery is expressed using both financial and non-financial indicators. Financial indicators show that pledges and payments to the Technical Cooperation Fund totalled \$75.9 million (not including NPC, APC and miscellaneous income), or 94.8% of the \$80 million TCF target set for 2008. For the technical cooperation programme as a whole, new resources stood at \$91.5 million, down from the 2007 total of \$100.3 million. The programme disbursed a total of \$96.4 million (including in-kind), and achieved an implementation rate of 72.9% (\$83.1 million in new obligations). Non-financial indicators show that in 2008 the programme delivered support to 122 countries and territories; 3240 expert and lecturer assignments were carried out, 3676 participants attended meetings, 2744 people took part in 177 training courses and 1621 benefited from fellowships and scientific visits.

Part C of this document responds to the operative paragraphs of resolution GC(52)/RES/11, dealing with assistance to Member States in the safe, secure and peaceful uses of atomic energy and nuclear techniques in specific fields. This part highlights activities and achievements in technical cooperation in each of the regions in 2008, describing regional emphases and responses to national priorities. Each region presents project information according to thematic sector, including human health, agricultural productivity and food security, water resource management, environmental protection, industrial applications, sustainable energy development and safety and security. The largest single sector of the TC programme in 2008 was human health, accounting for 26.8% of the programme. The second largest sector was food and agriculture, with 14.0%, followed by management of radioactive waste at 9.5%. Distribution, however, varied considerably between the regions.

Human health was the largest TC sector in Asia and the Pacific, Europe and Latin America. In Asia and the Pacific, efforts to improve the quality of health services in the region included activities to strengthen nuclear medicine and diagnostic techniques for the management of cancer, with a focus on the establishment of cyclotron and positron emission tomography (PET) centres. In Europe, quality assurance was a major area of concentration. Quality Assurance Team on Radiation Oncology (QUATRO) missions in support of improved radiotherapy practices were carried out in Albania, Montenegro and Poland and new tools to audit quality in nuclear medicine (QUANUM) and diagnostic radiology improvement and learning (QUAADRIL) were piloted in Slovenia and Bosnia and Herzegovina respectively. In Latin America and the Caribbean, health activities covered a range of topics that included the extension of a telemedicine network, malaria control and improvements to the nutritional status of women and children.

Food and agriculture was the largest TC sector in Africa and tsetse fly eradication continued to be a major focus in the region, with projects in Ethiopia, Kenya and Senegal all showing good progress and preparatory activities being carried out in Burkina Faso. Laboratory capacities were also strengthened in the region, including Mauritania and Sudan, improving diagnostic capacity and enhancing productivity.

The lack of a reliable energy supply has been identified as a significant impediment to the achievement of the Millennium Development Goals, and TC activities in the area of energy continued in all regions. Throughout 2008, the Agency provided Member States with support in energy assessments, feasibility studies, infrastructural strengthening and lifecycle extension. In Africa, an AFRA project is helping 29 Member States to build local capacities for sustainable energy development, while in Asia and the Pacific, several Member States were familiarised with the IAEA guidelines 'Milestones in the Development of a National Infrastructure for Nuclear Power'.

In addition, seven countries in the Middle East were helped to carry out a comparative assessment of electricity generation options. In Europe, Member States considering launching a nuclear power programme were also familiarized with the Milestones guidelines, while countries wishing to extend the lifetime of existing plants were supported through a regional project to strengthen capabilities for plant performance and service life. In Latin America, Argentina, Brazil and Mexico were also supported in the area of nuclear power plant life extension.

Safety and security issues cut across all TC activities, and are tailored to fit each region. The legislative assistance programme seeks to promote adherence to the international instruments adopted under the IAEA's auspices and to assist Member States in implementing their obligations thereunder, at the national level. Legislative assistance and strengthening of radiation and waste safety

infrastructure were key areas of focus in Africa. The safe, reliable and effective operation of nuclear power plants was a priority area for technical cooperation in Asia and the Pacific. In Europe, emphasis was given to nuclear installation safety and to the control of radiation sources. Particular attention was given to radioactive waste management and decommissioning using the modalities of training and exchange of experience. Other successes in the region in 2008 were the repatriation of spent fuel from Portugal to the USA, and from Hungary to Russia, and the conclusion of a model 'Transit Agreement' that can be used by Member States seeking to transport spent nuclear fuel across multiple countries to the country of origin. In Latin America, safety and security activities continued in the six thematic areas, with a focus on upgrading nuclear safety infrastructure and preparing for and responding to emergencies.



The Agency's Technical Cooperation Programme at a Glance (as at 31 December 2008)

The target for voluntary contributions to the Technical Cooperation Fund for 2008 was **\$80 million**.

New resources for the technical cooperation (TC) programme were **\$91.5 million**.

- Technical Cooperation Fund (including NPC, APC, miscellaneous income): **\$79.9 million**
- Extrabudgetary resources: **\$9.8 million¹**
- UNDP resources: **\$0.2 million**
- In-kind contributions: **\$1.7 million**

The adjusted budget for the TC programme for 2008 was **\$114.0 million**.

Disbursements for the TC programme (including in-kind) reached **\$96.4 million**.

The implementation rate for the programme was **72.9%**.

Net new obligations during the year were **\$83.1 million**.

The Rate of Attainment stood at **94.7%** at the end of 2008.

The number of countries/territories receiving support from the programme was **122**.

3240 expert and lecturer assignments were organized and arrangements made for **3676** meeting participants and other project personnel. **177** training courses were arranged for **2744** participants. **1621** fellows and scientific visitors were trained.

109 Member States have concluded Revised Supplementary Agreements.

6 Country Programme Frameworks were signed by Member States and the Agency in 2008. **50** CPFs are still current.

¹ Please refer to Table A.5 of the Supplement to this Report for details

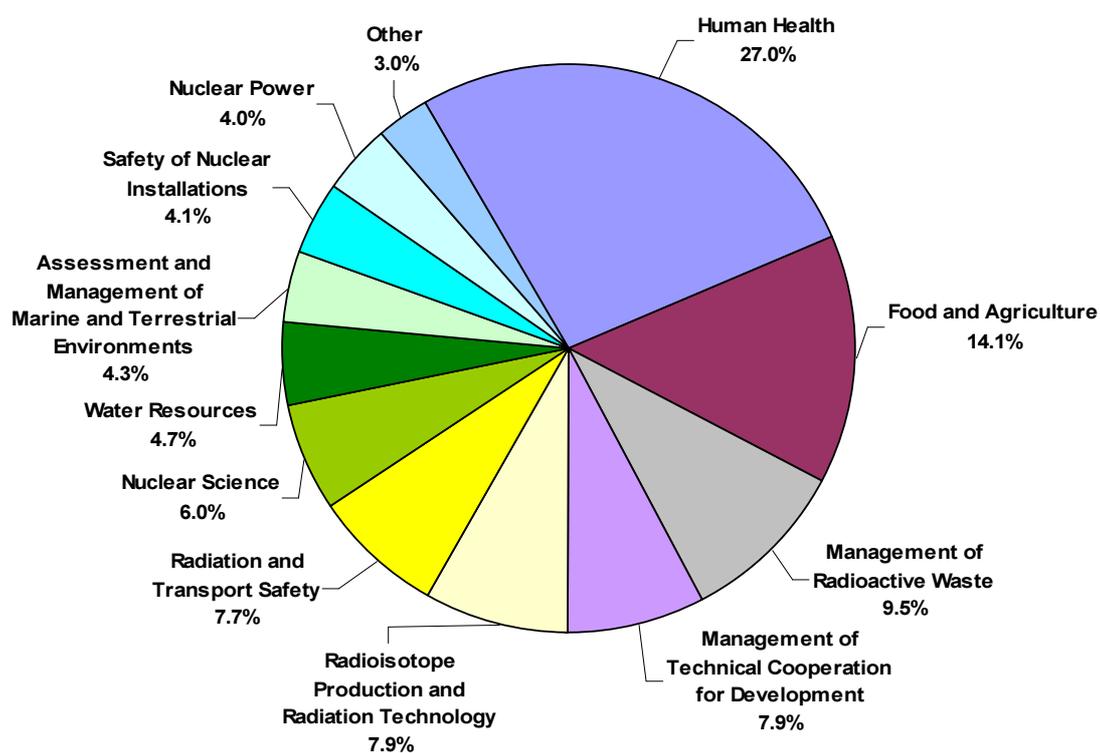


Figure 1: Disbursements by Agency Programme for 2008²

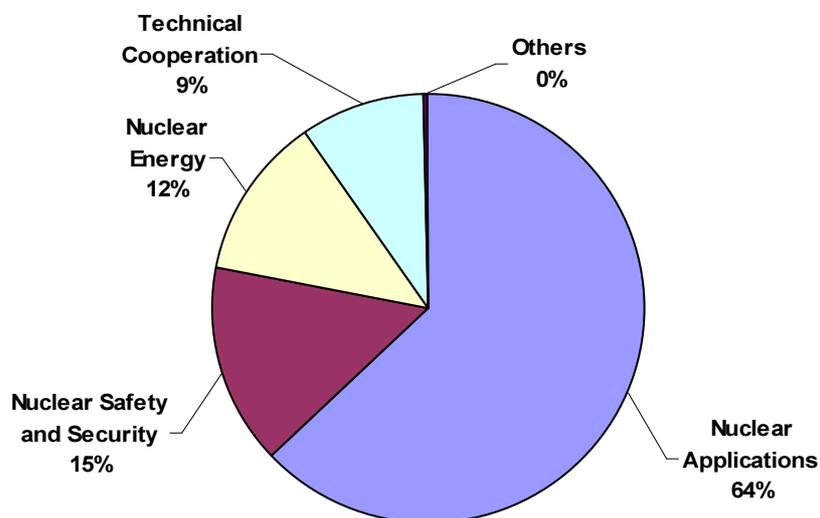


Figure 2: Technical Department support for TCP implementation according to primary technical officer

² Throughout this report, percentages in charts may not add up exactly to 100% due to rounding.

Technical Cooperation Report for 2008

Report by the Director General

1. This document responds to the request by the General Conference to the Director General to report on the implementation of resolution GC(52)/RES/11.
2. Part A of the document focuses on an overview of technical cooperation activities from 1 April 2008 to 31 March 2009. Section A.1 reviews activities to enhance the effectiveness of the Technical Cooperation (TC) programme during the period under review, focusing on the theme of technical cooperation as a common responsibility shared between Member States and the IAEA Secretariat. It starts with a section on the contributions made by all TC stakeholders, and presents the current status of Country Programme Frameworks (CPFs) and linkages to United Nations Development Assistance Frameworks (UNDAF). The section goes on to discuss the importance of partnerships with international and regional development organizations, giving examples from each of the four regions. IAEA efforts to contribute to the global effort to achieve the Millennium Development Goals (MDGs) are addressed and the current status of Technical Cooperation among Developing Countries (TCDC) is reviewed. Section A.2 concentrates on the delivery of the TC programme, covering evaluations of TC activities over the course of 2008 and developments to the Programme Cycle Management Framework (PCMF), and examining efforts in the area of results based management, quality assurance and standardized quality criteria and performance indicators. The section ends with a wrap up of outreach initiatives.
3. Part B presents a summary of indicators, reviewing mobilization of resources for TC through the Technical Cooperation Fund and presenting extrabudgetary and in-kind contributions. Part B closes with a synopsis of financial and non-financial indicators relating to programme delivery.
4. Part C responds to the operative paragraphs of resolution GC(52)/RES/11, dealing with assistance to Member States in the peaceful, safe, secure and regulated application of atomic energy and nuclear techniques in specific fields. It highlights activities and achievements in technical cooperation, presenting national projects and regional achievements.

A. Strengthening the Agency's Technical Cooperation Activities³

A.1. Technical Cooperation: A partner in development

A.1.1. The technical cooperation programme: A shared responsibility

5. The IAEA's technical cooperation programme is a shared responsibility, the result of the combined efforts of the technical Departments, the Department of Technical Cooperation and the Member States themselves. Each stakeholder provides a different type of contribution: programme development, management and coordination on the part of the Department of Technical Cooperation and expert scientific and technological support by the technical Departments, together with a range of responsibilities, activities and initiatives undertaken by the Member States, including Technical Cooperation Fund (TCF) payments, payment of National Participation Costs (NPCs), government cost-sharing, in-kind support and extrabudgetary funding. In 2008, this shared responsibility took place against a challenging backdrop of global crises, not only in the economic sphere, but also in the areas of energy, food security, human health, water and the environment.

6. 2008 also saw a great deal of effort concentrated on the preparation of the 2009–2011 TC programme. This unique three year cycle, which aligns the TCF and regular budget cycles, drove a significant effort on the part of Member States and the Secretariat to formulate a strong programme that takes full advantage of the additional year.

7. Member State support to the TC programme remained strong, and this was

reflected in the high Rate of Attainment of 94.7% achieved, and in the level of in-kind support provided to a range of national and regional projects. Extrabudgetary support from donors and international and bilateral organizations reached \$6.3 million, on a par with contributions in 2007. Twenty-five countries contributed to the TC programme through the cost-sharing mechanism in 2008, providing over \$3.5 million in support. In Africa, for example, the cost-sharing mechanism has been used by several Member States, including Algeria, Egypt, Ethiopia, Ghana, Mauritius, Niger, Nigeria, Tanzania and Tunisia, to establish infrastructure to fight cancer and to improve radiation protection capabilities.

A.1.2. Country Programme Frameworks (CPFs) and Revised Supplementary Agreements (RSAs)

8. Country Programme Frameworks, prepared in collaboration by Member States and the Secretariat, define mutually agreed priority development needs and interests to be supported through technical cooperation activities. These activities are based on the national development plan, country specific analyses and lessons learned from past cooperation.⁴ CPFs are used extensively in the preparation of each TC programme cycle. Once endorsed by both the Government and the Agency, the CPF is current for a given period, normally five years, following which a new CPF must be formulated taking into account evolving priorities and needs.

9. Six new Country Programme Frameworks were signed in 2008, by Bangladesh, the Central African Republic, Indonesia, Madagascar, Montenegro and Uganda, with Bangladesh, the Central African Republic and Montenegro signing CPFs for the first time. Tunisia signed a CPF in early 2009.

10. Revised Supplementary Agreements, governing the provision of technical assistance by the Agency, are in force in 108 Member States. Twelve Member States participated in the

³ Section A responds to operative paragraph 16 of resolution GC(52)/RES/11 on strengthening TC activities through the development of effective programmes and well defined outcomes.

⁴ CPF Operational Guidelines, August 2006.

TC programme in 2008 without having concluded an RSA. The Secretariat reiterates to these Member States the importance of concluding these Agreements, as required under the Statute and INFCIRC/267. RSAs contain essential provisions, including, inter alia, safety standards and measures, and the transfer of title to equipment and materials.

A.1.3. Improving interaction with United Nations Development Programme (UNDP) and other UN development organizations⁵

11. The Agency is required to consult and interact with the United Nations system organizations to ensure the coordination and optimization of complementary activities and to ensure that relevant UN organizations are regularly informed about the developmental impacts of the TC programme. Interactions took place at the country, regional and headquarters levels.

12. At the country level, the Agency strove to establish better working relationships with UN Country Teams (UNCT) led by the UN Coordinator. The Agency took part in the UNDAF process in Botswana, Niger and Nigeria in 2008, resulting in the signature of all three UNDAFs. The UNDAF is the strategic programme framework for the UNCT, and describes the collective response of the UNCT to the priorities in the national development framework – priorities that may have been influenced by the UNCT's analytical contribution. Although specialized agencies and non-resident agencies do not use the harmonized programme cycle of the United Nations Development Group (UNDG) Executive Committee agencies, they can engage in the UNDAF.⁶

13. At regional levels, linkages between the Regional Divisions, notably TCAF and TCEU, and the Regional Bureaux of UNDP were established to ensure that the developmental impact of the TC programme was adequately communicated. Joint programming initiatives were identified, in particular in areas such as health, food security, water, climate change and sustainable energy.

14. At HQ levels, the Agency shared information on how it carries out its technical cooperation mandate and activities. The United Nations Chief Executives Board (CEB), and in particular the United Nations Development Operations Coordination Office (UNDOCO) (the former UNDG Office) have been identified as the appropriate points of entry, as most UN partner organizations of the IAEA regularly participate in the relevant meetings. This allows for economies of scale in initiating outreach and partnership building initiatives for the Agency.

A.1.4. Building partnerships with international and regional development organizations⁷

15. In the Africa region, efforts to build strategic partnerships with donor countries and regional organizations resulted in the active participation of several donor countries in the implementation of the Agency-supported programme in the region. Member State interest in sharing the cost with the Agency for building basic infrastructure also increased significantly. France, Spain and the USA provided extrabudgetary contributions to fund nuclear safety and security activities in the region. Steps were also taken to develop partnerships with the European Commission (EC) in support of key

⁵ Section A.1.3. responds to operative paragraph 17 of resolution GC(52)/RES/11 on continued consultations and interactions with interested States, the United Nations system, multilateral financial institutions, regional development bodies to ensure coordination of activities and resources.

⁶ <http://www.undg.org/index.cfm?P=232>

⁷ Section A.1.4. responds to operative paragraphs 17 and 23 of resolution GC(52)/RES/11 on continued consultations and interactions with interested States, the United Nations system, multilateral financial institutions, regional development bodies to ensure coordination of activities and resources and consultations between the Secretariat and Member States on the support for and implementation of activities under regional cooperation agreements and arrangements.

socioeconomic areas such as energy, health and environment.

16. Collaboration was further developed with the African Union's Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC), the Global Environment Facility (GEF), the United Nations Trust Fund for Human Security (UNTFHS) and the African Development Bank (AfDB), focusing on the New Partnership for Africa's Development (NEPAD) related activities. The Agency continued to support the AFRA intergovernmental arrangement at the policy and programmatic levels as the main vehicle and modality to advocate for NEPAD and to raise awareness of NEPAD related activities. Cooperative projects, mainly undertaken under AFRA, addressed NEPAD sectoral priorities in the areas of food and agriculture, energy development, water resource assessment, health care and human resource development. Agency activities in support of NEPAD for the period July 2007–April 2008 were included in the Annual Report of the United Nations' Secretary General to the UN Committee for Programme and Coordination (CPC) on UN Support to NEPAD.

17. A partnership with the Global Environment Facility, initiated under an earlier project, RAF/8/041, 'Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer (UNDP/GEF)', was enhanced in 2008 and a new medium sized project, RAF/8/042, 'Adding the Groundwater Dimension in the Nile River Basin', was approved for the 2009–2011 TC cycle, with UNDP as a third international partner. This project, involving Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Uganda and United Republic of Tanzania, was officially launched in Vienna in January 2009.

18. A number of major events were implemented by the Agency in 2008 under a project funded by UNDP/GEF on the Nubian Sandstone Aquifer System (NSAS), involving Chad, Egypt, Libya and Sudan. Support was provided to the national stakeholders' meetings

in Egypt and Sudan, as well as to national training courses in the development of the Shared Aquifer Diagnosis Analysis (SADA) in Sudan and Egypt. A regional training course was held in Egypt, offering comprehensive advanced training in isotope hydrology techniques, with a focus on field methods and groundwater sampling.

19. The partnership with the United Nations Fund for International Partnerships/United States (UNFIP/US-DOS) under RAF/5/051 'Sterile Insect Technique (SIT) for Area-wide Tsetse and Trypanosomosis Management,' concluded successfully with the submission of the final technical and financial report in January 2009. The project helped nine Member States party to the PATTEC programme to accomplish various phases essential for the creation and subsequent expansion of zones under agricultural development that are sustainably free of tsetse flies and the diseases they transmit. Partnerships with the UN Trust Fund for Human Security, the US, OPEC Fund and China have also helped Ethiopia's progress with the biggest tsetse and trypanosomosis eradication project ever.

20. In the Latin America region, building partnerships, often based on previous successes, between scientific and developmental authorities and exploring new means of cooperation between Member States remained a major management objective. A regional project, RLA/8/036, 'Sustainable Integrated Management of the Guarani Aquifer System', a collaboration between the Global Environment Facility, the World Bank and the Organization of American States (OAS), aimed at understanding the complex Guarani Aquifer shared by Argentina, Brazil, Paraguay and Uruguay. The project compiled isotopic, geochemical and hydrogeological data necessary to design reference hydrological thematic maps showing areas of active recharge and areas with old groundwater, and led to the development of the first conceptual model of the aquifer, including regional flow patterns, and constraints for the numerical model. The project continues to foster cooperation between the four countries in designing sound management practices, and has been instrumental in new cooperation initiatives

with GEF, World Bank and OAS on the Amazon Basin (involving Bolivia, Brazil, Columbia, Ecuador, Peru and Venezuela), and the Artibonite River Basin (involving Dominican Republic and Haiti).

21. Partnerships are also important in improving the quality of human health services in the Latin America region. In 2008, the Agency worked closely with the Pan American Health Organization (PAHO) to design and plan subregional project RLA/6/067, 'Cancer Prevention and Integral Cancer Care in Central America and the Dominican Republic'. The project aimed to overcome the fragmented and poorly coordinated systems of care provided in many developing Member States in the region, and to begin building comprehensive epidemiological records in participating Member States.

22. In effective collaboration with the Latin American Energy Organization (OLADE), the Agency provided advice and training on energy planning for sustainable development through national and regional projects to Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela in 2008. Around 120 professionals from the region attended training courses and workshops. Agency assistance focused on the analysis of future energy demand of all energy carriers and the energy supply system needed to satisfy the future needs. In partnership with OLADE, distance learning courses on Energy Economics and Environmental Impacts from the Energy System were conducted; using this modality around 320 people from the region were trained.

23. In the Europe region, the European Union is a key partner. The European Commission has provided extrabudgetary contributions on behalf of the EU to several projects in the region, financed by the former Technical Assistance to the Commonwealth of Independent States (TACIS) programme and more recently by the Instrument of Pre-Accession Assistance (IPA). The IPA was designed to enhance the national

regulatory infrastructure of the Balkan countries in aligning legislation and practices to the EU community *acquis* in this field and its financial mechanism was also used to support the spent fuel repatriation project of the Vinca reactor in Serbia.

24. Efforts to build strategic partnerships with donor countries and regional organizations continued throughout 2008 in the Asia and the Pacific region. As a result, several donor countries participated in the implementation of TC activities in the region, and Member State interest in sharing the cost of national projects through building basic infrastructure increased. The USA provided extrabudgetary contributions to fund activities in the field of highly enriched uranium and recovery of orphan sources in Vietnam and China, while several Member States used cost sharing mechanisms: Pakistan, to improve regulatory performance; and the Philippines, to upgrade a gamma irradiation facility.

25. The RCA initiated action through its regional office in the Republic of Korea to establish collaboration with the Clean Air Initiative for Asia (CAI-Asia), the Partnership for the Environmental Management of the Seas of South Asia (PEMSEA), the Asian Regional Cooperative Council for Nuclear Medicine (ARCCNM) and UNDP.

A.1.5. Linking to the Millennium Development Goals (MDGs)⁸

26. The Agency's technical cooperation activities address a wide range of development issues identified by the Member States themselves, and contribute to the global effort to attain the Millennium Development Goals. Activities are broad based and cover human nutrition and maternal health, environmental management and other related activities. The Agency has the potential to play a larger role,

⁸ Section A.1.5. responds to operative paragraph 20 of resolution GC(52)/RES/11 on the promotion of key areas identified in the Johannesburg Plan of Implementation and the attainment of the Millennium Development Goals.

however, in the area of safe and reliable energy for sustainable development. A report by the Task Force for the UN Millennium Project, 'Energy Services for the Millennium Development Goals', warns that without increased investment in the energy sector, and major improvement in the quality and quantity of energy services in developing countries, none of the MDGs can be met because energy is central to sustainable development and poverty reduction efforts. Through an integrated system approach, the Agency works to help Member States develop the skills and understanding needed to assess national energy requirements, prepare energy plans and alternative scenarios, enable policy frameworks, develop national capacities and capabilities and provide knowledge-based advisory services for expanding access to energy services for the poor.

27. In the Latin America and the Caribbean region, energy services for sustainable development priorities are supported under RLA/0/029, 'Capacity Building for the Development of Sustainable Energy' which provides Member States with the tools and capabilities to develop diversified supply and demand models that allow participating States to vary conditions for energy development and use according to national goals and aspirations. The project is carried out in partnership with OLADE. Haiti, the only least developed country (LDC) in the region, has benefited from this approach and, through HAI/0/004 'Strengthening the Management and Development of Energy Sources in Haiti', has produced a preliminary draft to help guide restructuring of the energy sector.

A.1.6. Regional cooperation and Technical Cooperation among Developing Countries⁹

28. The 2009–2011 technical cooperation programme is the first to be formulated with the

support of strategic frameworks for regional cooperative planning for Africa, Europe and Latin America and the Caribbean, developed by the Member States themselves. These frameworks, established over the course of 2007, have served as the basis for the regional components of the 2009–2011 programme, and are important planning tools for setting regional cooperation activities. The frameworks enhance horizontal collaboration among Member States and cooperation with other partners, and have considerably strengthened a strategic approach to technical cooperation in the regions. In Asia and the Pacific, regional strategic planning began in 2006 with the RCA Medium Term Strategy and Implementation Plan for 2006–2011, which has already proved its value in formulating the 2007–2008 regional programme. Frameworks for strategic regional planning encourage coordinated upstream work in the preparation of the TC programme, and build ownership and self-reliance in the regions.

29. AFRA's Regional Strategic Cooperative Framework (RCF), adopted in 2007, guided the development of the AFRA programme for the 2009–2011 TC cycle. The RCF includes areas previously not covered under AFRA, such as the use of stable isotope techniques in human nutrition, tracking drug resistant communicable diseases, and screening for livestock diseases. Regional capacity in terms of human resources and laboratory infrastructure in these areas has grown steadily in recent years and the region is now ready to utilize this infrastructure to address issues of mutual interest.

30. The TCDC modality was used in all IAEA-supported programmes in Africa throughout 2008, particularly in AFRA activities, and notably through the most advanced AFRA Member States where nuclear infrastructure is well established. Emphasis was placed on developing human resources using the African resources institutions, in particular AFRA Regional Designated Centres (RDCs), to help national nuclear institutions to promote peaceful applications of nuclear techniques in the areas of non-destructive testing techniques, mutation breeding and biotechnology, radiation oncology and medical physics, radioactive waste

⁹ Section A.1.6. responds to operative paragraph 23 of resolution GC(52)/RES/11 on consultations between the Secretariat and Member States on the support for and implementation of activities under regional cooperation agreements and arrangements.

management, radioisotope technology, information and communication technology (ICTs), accreditation/certification, radiation processing and maintenance of scientific equipment. AFRA continued to facilitate the staging of regional conferences in support of its programme – another TCDC modality that promotes regional networking and information sharing. Recent conferences included the First Regional Conference on Nuclear Medicine and Medical Physic, held in Khartoum, Sudan, in February 2008, and the Fifth African Conference on Non-Destructive Testing, held in Hammamet, Tunisia, in March 2008.

31. The European Regional Profile (ERP) adopted by the IAEA and Member States in the Europe region for the period 2009–2013 was used to guide the submission and selection of regional project concepts for the 2009–2011 TC programme. As follow up, in May 2008, the TCEU Member States agreed on a Common Position Paper (CPP) on the preparation of a regional technical cooperation strategy, recognizing that regional cooperation is the best mechanism to promote effective and open exchange of know-how and experience. The document emphasized the need to develop a strategy to address the recommendations in the ERP. At a regional meeting during the 52nd General Conference, Member States from the region agreed to put together a programme of work to prepare a strategy paper within the first two quarters of 2009.

32. In Latin America, the regional profile was adopted in 2007, increasing the importance of the regional dimension of programming, and guiding regional priorities and project selection and formulation for the 2009–2011 TC programme. Linkages between regional and national activities were strengthened due to the greater clarity of purpose gained by comparing and contrasting the regional profile with national CPFs. This is particularly true in the area of environmental management: TC project RLA/7/012, ‘Use of National Techniques to Address Management Problems of Coastal Zones in the Caribbean Region’, for example, is fostering collaboration between 12 Member States as well as with United Nations Environment Programme’s

(UNEP) Caribbean Regional Coordinating Unit, France, Italy and Spain. In addition, new regional projects have been successfully formulated based on the experience of earlier national and regional activities. A new project on the application of Nuclear Techniques for the Development of a Management Plan for the Watershed of the Great Lakes of Nicaragua builds on the results of past and concurrent projects and the related regional TC programme on the marine environment, to focus investigations of soil erosion for watershed management.

33. Regional support had considerable benefits at the national level. El Salvador, for example, was able to strengthen focus on environmental management, with projects on monitoring contaminants in the coastal zone that influence harmful algal blooms (HABs), the pathway of contaminants from surface to underground water and the use of nuclear techniques to assess the impact of heavy metals on environmental pollution. In Colombia, the TC regional project RLA/8/031, ‘Sustainable Management of Groundwater Resources’, made a significant impact at the national level, resulting in the adoption of sustainable groundwater management practices.

34. In the Asia and the Pacific region, regional projects, including those under RCA and ARASIA, continued to be the primary mechanism for TCDC. In 2008, the RCA Member States appointed a Working Group to examine how to further enhance TCDC activities in the RCA Programme and adopted eleven recommendations. The main recommendations invite RCA Member States to identify TCDC interventions and initiatives at the planning and design stages of the RCA Projects, to improve the utilization of Regional Resource Units, to enhance the utilization of regional experts and lecturers, to develop an exit strategy under each project, including identification of TCDC activities that would contribute to sustainability of the projects at both national and regional levels and to obtain funds for implementing TCDC activities. These recommendations will be implemented from 2009 onwards.

A.2. Delivering the technical cooperation programme¹⁰

A.2.1. Strengthening Member State capacities: Technical cooperation in 2008

35. In 2008, the technical cooperation programme delivered support to 122 countries and territories, 3240 expert and lecturer assignments were carried out, 3676 participants attended meetings, 2744 people took part in 177 training courses and 1621 people benefited from fellowships and scientific visits. The programme disbursed a total of \$96.4 million, with an implementation rate of 72.9%.

36. The 2009–2011 programme, consisting of 551 new core funded projects in 115 countries and territories, aims to address the development priorities identified by Member States as efficiently and effectively as possible. Human health, nuclear safety and food and agriculture remain the top three areas of Member State concern, with radioisotope production and radiation technology in fourth place.

37. As part of its contribution to international efforts to support nuclear education and preserve nuclear knowledge, the Agency sponsors the World Nuclear University (WNU). In 2008, the Agency supported the participation of 13 participants from 11 Member States, enabling them to attend the WNU's Summer Institute held in Ontario, Canada, in August.

38. The Agency is committed to gender equality. TC activities strive to further gender equality by supporting the inclusion of gender considerations in the TC programme, providing guidance in the CPF Guidelines and Project Concept Notes, and encouraging the participation of women as experts, trainees and fellows. Further statistical information on female participation in the TC programme in 2008 is

given in Table C4 of the Supplement to this report.

A.2.2. Evaluating technical cooperation: The OIOS reports

39. The Office of Internal Oversight Services (OIOS) undertook a review of the management of the technical cooperation programme in 2008. This critical review recommended that a set of 'house keeping' activities to fix certain identified areas be undertaken, and also led to a process of rethinking the Agency's technical cooperation. These issues are now being addressed.

40. OIOS also carried out four programme evaluations in 2008. These were: Evaluation of TC projects on sustainable intensification of crop production systems; Evaluation of the Country Programme Framework; Evaluation of Thematic Planning; and Evaluation of the TC Interregional Programme. The evaluation of intensification of crop production systems noted that these types of projects had realistic objectives and reinforced the position of counterpart institutions within the national agricultural research systems, but remarked that the extent of adoption by farmers was unknown, as no adoption-related indicators were built into the project. The remaining three evaluations focused on aspects of the TC programme planning process, and found several key common issues, including the need to reinforce strategic planning and to prioritize areas for cooperation, to strengthen needs assessment processes, and to ensure better coordination and participation of Member States in the planning of the TC programme. These recommendations are now being followed up by the Secretariat.

A.2.3. PCMF enhancements¹¹

41. The PCMF IT platform was used as the central mode for communication between Member States and the Secretariat in the development of the 2009–2011 TC programme,

¹⁰ Section A.2. responds to operative paragraphs 8 and 12 of resolution GC(52)/RES/11 on enhancing the effectiveness and efficiency of the TC programme and on strengthening TC activities, including the provision of sufficient resources.

¹¹ Section A.2.3. responds to operative paragraph 24 of resolution GC(52)/RES/11 on continuing to implement the Programme Cycle Management Framework.

and was also used to prepare programme documentation for the Technical Assistance and Cooperation Committee (TACC) and the Board of Governors. Information on the deadlines, guidelines and procedures to follow were made available online, and the submission of concept documents by Member States and their subsequent appraisal by Agency staff was facilitated via the website, as was the collaborative project design phase. Project classifications were simplified into two categories, New and Ongoing, meaning that all projects are now approved by the Board for the full life cycle of the project, without the need for re-approval.

42. Over 2100 users from both the Agency and Member States used the PCMF IT platform in 2008. Agency staff used the system daily, while Member State usage peaked depending on where they were in the design cycle. A TC PCMF User Survey conducted at the end of 2008 found that 32% of Member State users used the system frequently. A total of 1199 concepts were uploaded, resulting in 649 projects.

43. Further improvements to the PCMF system were also made in the areas of reporting. Additional financial reports were made available and all reports were made visible to all the technical Departments and to the TC Department. A monitoring and reporting module has been developed as part of PCMF phase III. It focuses on the collection of outcome level information from the counterpart, and supports results-based management.

A.2.4. Results based management and quality assurance

44. Quality management concentrated on three key areas in 2008. First of all, significant efforts were made to ensure that established criteria for relevance, ownership, commitment and sustainability were met during the planning for the 2009–2011 TC programme. In support of this goal, a Rapid Quality Assessment was conducted during the planning process to identify gaps and improve the quality of planning and documentation required at that stage. Efforts were also made to improve TC processes across

the entire planning cycle, particularly in relation to input by the Agency on human resource development. Continued progress was made in developing and supporting related IT applications for the efficient implementation of the programme. A training programme to build awareness of Quality Management was launched in March 2009.

45. Quality management is now being mainstreamed into day-to-day TC management practice as part of the ongoing 'Fixing Exercise'. An important output of the exercise will be a TCP Operations Manual. Task Forces have been established by the DDG-TC on Documentation Repository; Process Framework and Interactive Processes; Project Management Policy Framework; Performance Indicators/Monitoring; and IT Strategy.

A.2.5. Standardized quality criteria and performance indicators

46. The quality criteria applied across the programme cycle are being aligned to the various PCMF development phases. Two initiatives are now being undertaken in parallel: the TCP Operations Manual is being reviewed and updated processes and standards for the programme cycle are being compiled and a periodic progress report module for progress and performance monitoring at the outcome level has been designed and is in the process of testing. The present reporting and monitoring mechanism will be consolidated in a uniform electronic system, allowing information to be stored and aggregate results to be produced for final reports at project and programme levels. The new system will also support tracking follow up to various recommendations and will record performance.

47. The task of developing theme-based Standardized Performance Indicators, initiated in 2007, was continued in 2008 and has been incorporated into the current Fixing Exercise. Efficiency and effectiveness indicators for project and programme activities are also being developed.

A.2.6. Enhancing outreach¹²

48. Several new outreach products, including new project success stories and French and Spanish versions of existing outreach material, were produced in the course of 2008. Some 600 brochures and over 5,000 project success stories were distributed at meetings, workshops and exhibitions and were also used to support staff travel and missions.

49. The TC exhibition was used to support several meetings in Vienna: Meeting on Nuclear Knowledge for Management: Cooperation for Development, World Environment Day, International Symposium on Induced Mutations in Plants, and a display on Namibia. A seminar

to inform Member States not represented in Vienna about IAEA technical cooperation activities was conducted at the United Nations Office at Geneva in October, accompanied by an exhibition. A well attended Insight Seminar was also conducted on technical cooperation during 2008 and information was provided at the TC Service Desk during the 52nd General Conference.



Technical Cooperation participation in the IAEA exhibition, World Environment Day, June 2008

¹² Section A.2.6. responds to operative paragraph 14 of resolution GC(52)/RES/11 on updating on the progress of the TC programme implementation in between annual reports.

B. Mobilizing Resources for the TC Programme

B.1. Summary of financial indicators for 2008

50. As of 31 December 2008, pledges against the 2008 Technical Cooperation Fund target totalled \$75.9 million or 94.8% of the \$80.0 million target. The rate of attainment at the end of 2008 (based on payments received, \$75.8 million) stood at 94.7%, reflecting unpaid pledges of slightly less than \$0.1 million. Total resources and net new obligations for 2008 remain high, but show a decrease from 2007 (Fig.3).

attainment reached 94.7% as of 31 December 2008. Miscellaneous income as a net result of gain/loss on exchange, interest income and bank charges totalled approximately \$2.6 million in 2008.

B.2.2. Payment of National Participation Costs and Assessed Programme Costs (APCs) arrears

52. Payments of National Participation Costs totalled \$0.2 million out of a total of \$0.3 million, leaving outstanding payments of some \$0.1 million for 2008. This latter amount, together with \$0.2 million arrears for the 2005–2007 period, gives a total amount outstanding of some \$0.3 million.

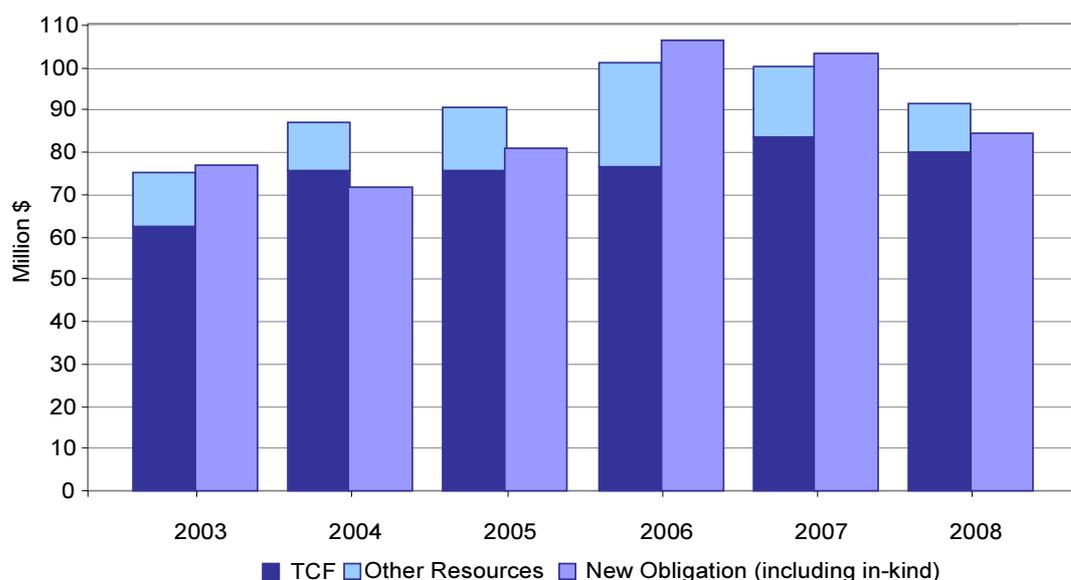


Figure 3: TCP resources and new obligations between 2003 and 2008

B.2. Technical Cooperation Fund¹³

B.2.1. New resources

51. New resources for the TCF in 2008 reached \$79.9 million, slightly down from the previous high of \$83.6 million in 2007. The rate of

53. In December 2008 the Secretariat sent letters of invoice for NPCs to 91 Member States with reference to the TC programme for the 2009–2011 triennium. The Secretariat makes every effort to confirm deposits of NPC payments as quickly as possible—as soon as the minimum NPC payments are received, the projects are made operational. Until the new projects are operational, the Secretariat takes whatever actions it can to begin planning the implementation of the project in accordance with the agreed work plan. However, in accordance

¹³ Section B.2. responds to operative paragraphs 6 and 7 of resolution GC(52)/RES/11 on timely payment of TCF contributions, NPCs and payment of APC arrears.

with the rules applicable to NPCs, contracts that result in financial obligations may only be signed when the project is fully funded. Thus, the Secretariat must exercise caution to assure that these guidelines are followed strictly.

54. The rate of payment of minimum NPCs in 2009 shows that Member States are evidently experiencing the same difficulties in making timely payments as in 2005 and 2007. By the end of the first quarter of 2009, 30 Member States had not paid the minimum amount required to begin implementing their new national programmes. This meant that projects with 2009 TCF budgets totalling \$10.9 million, at that time, had not yet started. The fact that approximately the same number of countries, as in 2005 and 2007, had not paid the minimum NPC amount in 2009 is a cause for concern.

55. About \$0.5 million was also received through payments of outstanding arrears in assessed programme costs. As at 31 December 2008, the amount of arrears still outstanding for APCs was \$2.8 million.

B.3. Extrabudgetary contributions and in-kind contributions

56. Extrabudgetary contributions from Member States and international organizations accounted

for some \$6.3 million in new resources, with some \$0.9 million of that coming from Nuclear Security Fund resources used to implement activities through TC projects. An additional \$3.5 million was provided by Member States to support activities in their own country (so-called Government Cost Sharing). UNDP provided \$0.2 million. Figure 4 presents the extrabudgetary resources received over the past ten years, broken down by donor type. In-kind contributions accounted for \$1.7 million in 2008.

57. Extrabudgetary resources show a significant drop between 2006 – which was an exceptional year – and 2008. In 2006, TC received a considerable contribution from the Nuclear Security Fund for training activities, as well as generous extrabudgetary support from the US and the Nuclear Threat Initiative. Currently, some \$5 million is held in the footnote-a/ reserve account. Extrabudgetary contributions from donor countries and international and bilateral organizations remained fairly stable from 2007 to 2008, with the main decrease in figures caused by a drop in government cost-sharing. There are indications, however, that extrabudgetary resources are likely to rise again in 2009.

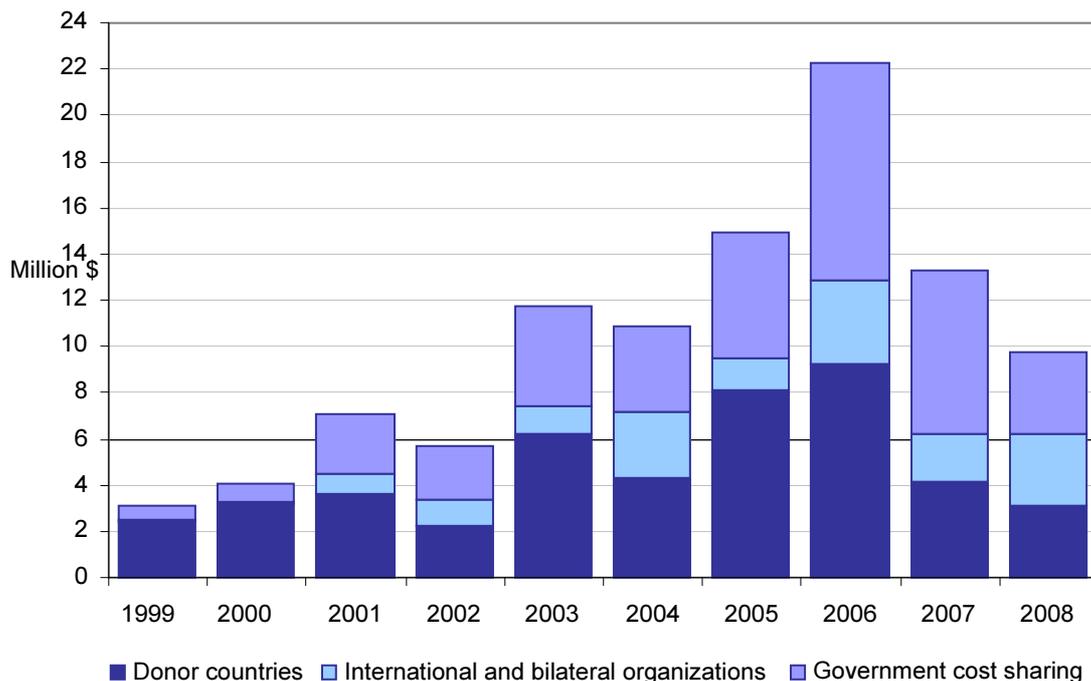


Figure 4: New extrabudgetary resources between 1999 and 2008

B.4. Programme delivery

58. TC programme delivery can be expressed in both financial and non-financial terms. Financial delivery is expressed in terms of disbursements and obligations. Non-financial (i.e. outputs) delivery can be expressed numerically in terms of experts deployed, training courses conducted or purchase orders placed, for example. For the programme as a whole, new resources stood at \$91.5 million. Implementation, measured against the adjusted programme for 2008, reached a rate of 72.9% (\$83.1 million for net new obligations against \$114.0 million for the adjusted programme), just below the rate of 74.9% attained in 2007 (Table 1).

Indicator	2007	2008	Increase/(decrease)
Adjusted programme	133 523 308	113 993 330	(19 529 978)
Net new obligations	100 012 964	83 086 573	(16 926 391)
Implementation rate	74.9%	72.9%	(2%)
Disbursements (including in-kind)	93 316 639	94 601 427	1 284 788

Table 1: Delivery of outputs: financial indicators for 2007 and 2008

B.4.1. Human resource and procurement indicators

59. Human resource and procurement indicators (non-financial delivery indicators) for 2008 show a slight decrease in expert and lecturer assignments, and in the number of meeting participants and other project personnel (Table 2). However, the total number of training courses and related participants shows a significant increase. Procurement shows a decrease – procurement is usually higher in the first year of the TC programme cycle, and 2008 was a second year. The Supplement to this report

Indicator	2007	2008	Increase/(decrease)
Expert and lecturer assignments	3546	3240	(306)
Meeting participants and other project personnel	4149	3676	(473)
Fellowships and scientific visitors in the field	1661	1621	(40)
Training course participants	2287	2744	457
Training courses	160	177	17
Purchase orders placed	2736	2064	(672)
Subcontracts issued	6	5	(1)

Table 2: Delivery of outputs: non-financial indicators for 2007 and 2008

gives a more detailed presentation of delivery in 2008, using both financial and non-financial indicators.

B.4.2. Financial indicators: Utilization of TCF resources

60. In financial terms, implementation of the TCF was high. New obligations, the measure that most closely indicates (in financial terms) the delivery set in motion during the year, reached \$73.5 million, down from \$83.9 million in 2007. Disbursements under the TCF were up slightly in 2008, reaching a level of \$80.9 million, as compared with \$77.9 million in 2007.

B.4.3. Unobligated balance

61. The unobligated balance at the end of 2008 was \$25.6 million, considerably higher than that at the end of 2007. Of this, some \$2 million had been added to the TCF in late 2008 based on account closure actions such as apportionment of interest income and the net effect of gain/loss on exchange. These additional resources only became available in February 2009. Table 3 presents a comparison of the TCF unobligated balance over the past five years. Out of the total of \$25.6 million at the end of 2008, some \$1.0 million represents pledges which have not yet

been paid. \$12.2 million represents cash held in currencies which are difficult to use in the implementation of the TC programme. Therefore, the useable unobligated balance stood at \$12.5 million at the end of the year.

organizations in the UN system are facing the challenge of a growing demand for a zero real growth budget, making the issue of sufficient, assured and predictable contributions the subject of policy debate and experimentation with new

Description	2004	2005	2006	2007	2008
Total unobligated balance	18 865 000	25 954 000	19 626 000	19 336 711	25 649 096
Pledges not yet paid	(2 484 331)	(1 638 570)	(1 642 125)	(1 142 148)	(993 287)
Non-convertible currencies that cannot be utilized	(12 612)	(12 004)	(12 090)	(11 934)	(11 911)
Currencies that are difficult to convert and can only be utilized slowly	(6 179 396)	(7 442 196)	(8 681 250)	(10 125 227)	(12 166 564)
Resources that can be used for TC programme obligations	10 188 661	16 861 230	9 290 535	8 057 402	12 477 344

Table 3: Comparison of unobligated balance of the TCF (in US dollars)

B.5. Ensuring that resources are sufficient, assured and predictable¹⁴

62. In 2007, in response to Member State requests, a paper on sufficient, assured and predictable funding for TC, GOV/INF/2007/15, was prepared by the Secretariat, presenting an historical overview of the initiatives and suggestions made to ensure sufficient, assured and predictable funding for the TCF. This was offered with a view to building on past experiences, and took into account the need to review approaches to funding given the new development environment.

63. The paper recognizes that the context in which funding efforts are made has a significant influence on the approach taken to resource mobilization. Some contextual factors are unique to the Agency, others are common to the UN system. The growing recognition of the critical value of national science and technology capabilities in working towards sustainable development and in meeting the MDGs is an important trend for the Agency. Almost all

funding strategies by various agencies. The roles and responsibilities of Member States are evolving, as national financial, scientific, technical and regulatory capabilities increase. This is leading to new approaches to cooperation with the Agency.

B.6. Buying power of the TCF

64. Purchases for the TC programme from TCF resources are split approximately equally between Euro and US dollars, with other currencies making up a very small part of the total disbursements. The TCF target is denominated in US dollars and the vast majority (over 90%) of contributions are received in US dollars. However, the US dollar has steadily declined in value between 2002 and 2008, and as a result, the Technical Cooperation Fund has suffered a significant loss in buying power. The Department of Technical Cooperation, along with MTBF, have begun requesting that TCF contributions are made in currencies that match historical patterns in distributions. This year a few countries have participated in the process. The goal in the future is to have contributions in Euros that are approximately 40% of the TCF target.

¹⁴ Section B.5. responds to operative paragraph 3 of resolution GC(52)RES/11 on establishing means, including mechanisms, that would achieve the goal of making TC resources sufficient, assured and predictable.

C. Programme Activities and Achievements in 2008¹⁵

65. Part C highlights some of the achievements of the technical cooperation programme in 2008 in each of the regions. The Agency's technical cooperation programme aims to promote tangible socioeconomic impacts in IAEA Member States by supporting the use of appropriate nuclear science and technology to address major sustainable development priorities at the national, regional and interregional levels. The programme concentrates on the delivery of support in six thematic areas (human health, agricultural productivity and food security, water resource management, environmental protection, physical and chemical applications and sustainable energy development, together with a seventh cross-cutting thematic area, safety and security), and supports the achievement of the MDGs. Working closely with the Agency's Technical Departments, which provide technical guidance, expertise and backstopping, the Department of Technical Cooperation interacts with national authorities in Member States at every stage of the programme, from initial formulation to implementation and evaluation.

66. Total disbursements under the TC programme in 2008 (including in-kind) were \$96.4 million. Table B3 in the Supplement to this Report provides a breakdown of disbursements by Agency programme. The largest single sector of the TC programme in 2008 was human health, accounting for \$25.8 million (26.8% of the programme). The second largest sector was food and agriculture, with \$13.5 million (14.0%), followed by management of radioactive waste at \$9.1 million (9.5%).

67. Distribution of the TC programme differed considerably between the regions, with food and agriculture accounting for 31.5% in Africa, but only 11.7% in Asia and the Pacific where human health accounted for the highest disbursement of

15.5%. Human health also topped the agenda in Europe, with 36.4%, followed by management of radioactive waste at 20.7%. In Latin America, human health again accounted for the highest disbursement, with 28.6%, followed by food and agriculture at 11.8%. The second highest area of disbursements in Africa was human health, at 26.3%.

C.1. Interregional projects

68. Interregional projects represent the smallest portion of the TC programme. In 2008, a total of \$2.1 million was disbursed under interregional projects out of the total of \$96.4 million. The largest sector was management of technical cooperation.

69. Interregional projects serve the common needs of several Member States in different regions. Interregional projects can be trans-regional, global or joint activities. Trans-regional projects deal with development issues involving countries from more than one region, but not necessarily all regions. Global projects provide a framework for the equitable participation of Member States in the development of material and knowledge that will be used globally. Projects may include the elaboration of guidelines, standards, curricula, teaching materials and the documentation of best practices. Joint TC activities with an international entity, formalized through a cooperation agreement, include projects in cooperation with ICTP Trieste (STEP), World Nuclear University and Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME).

¹⁵ Section C. responds to operative paragraph 22 of resolution GC(52)/RES/11 on supporting the self-reliance, sustainability and further relevance on national nuclear and other entities in Member States

C.2. Africa

C.2.1. Africa region at a glance

70. In 2008, the TC programme in Africa was implemented in 38 Member States among which 20 are Least Developed Countries. As of 31 December 2008, new obligations amounted to \$23.5 million. The financial implementation rate for 2008 was 76.4%. The distribution of disbursements in the region for 2008 by area of activity is shown in Fig. 5.

71. Throughout 2008, activities in the Africa region focused on helping African Member States to develop technical, managerial and institutional capacities in nuclear science and technology and applications and to address priority needs in various areas of socio-economic significance, including sustainable energy development, management of groundwater resources, control of human communicable diseases, support to nutritional intervention programmes, cancer management, increasing agricultural productivity, combating the tsetse fly

and other pests of agricultural and medical importance, industrial quality control, environmental protection, and nuclear safety and security.

72. Special efforts were made in developing the 2009–2011 programme cycle to enlarge the contribution of isotopes and nuclear techniques in areas of special economic and social significance, and to respond to the priority needs of Member States. The needs of LDCs were emphasized, including those of new Member States such as Malawi, Mauritania and Mozambique. As part of the upstream work, consultations with national authorities and prospective counterpart institutions were carried out through fact-finding and programming missions, pre-project assistance missions and consultation meetings in the region and at the IAEA headquarters.

- Target for voluntary contributions to the TCF from countries in the Africa region **\$0.6 million**
- Disbursements for the TC programme in Africa **\$27.0 million**
- Net new obligations in Africa for 2008 **\$23.5 million**
- Implementation rate for the programme **76.4%**
- Number of countries receiving support **38**
- Expertise was provided and exchanged through **617** expert and lecturer assignments, and between **359** meeting participants.
- Training was provided to **731** participants in training courses and **542** fellows and scientific visitors.

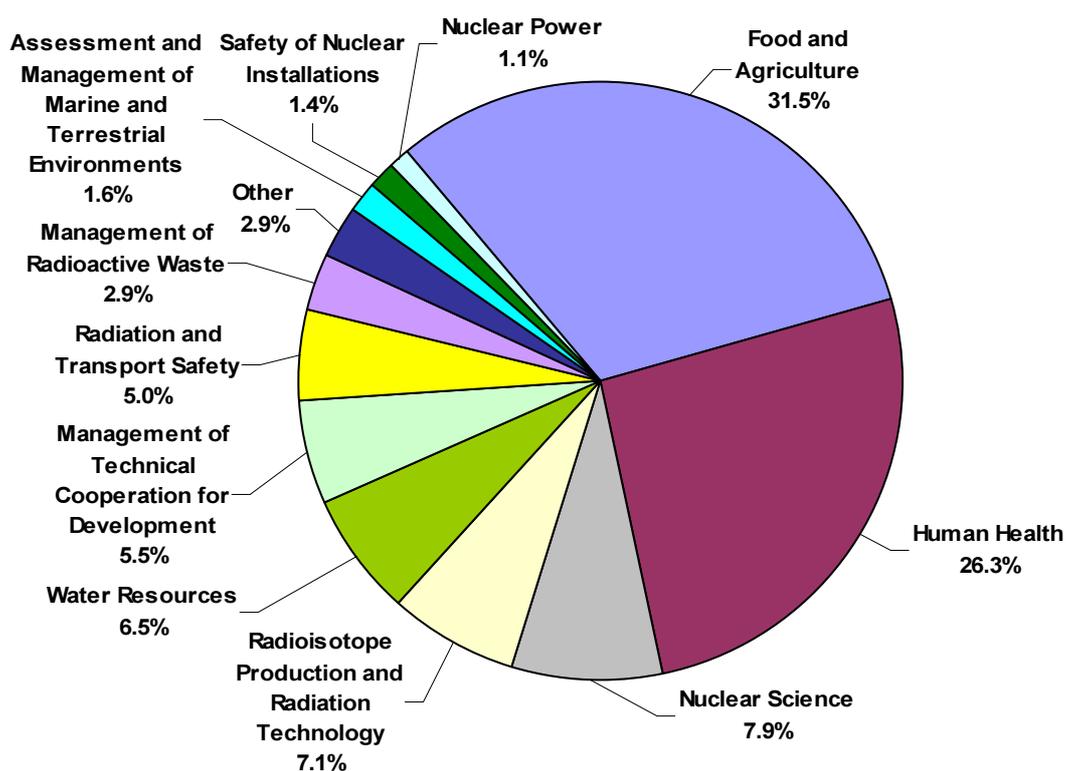


Figure 5: Disbursements by Agency Programme for 2008 – Africa

C.2.2. Building human capacity

Human resource development, higher education and networking

73. Efforts continued under AFRA project RAF/0/026, ‘Sustaining the Regional Capability for the Utilization of Information and Communications Technologies for Human Resource Development (AFRA V-6)’, to build ICT capabilities in Member States through the training of ICT developers and trainers and the provision of dedicated equipment. ICT telecentres were upgraded in South Africa and Uganda, and a new centre was established in Côte d’Ivoire. Specific regional training courses were held to promote the utilization of ICTs in human capacity building in nuclear science and technology.

74. A national information and documentation centre (IDC) was established at the Egyptian Atomic Energy Authority (EAEA), part of the development of an information society in Egypt. The IDC is being upgraded with modern information technology (IT) tools to facilitate the use of nuclear information for sustainable

development in Egypt and to raise awareness of the important role of nuclear science and technology. The IDC is playing an important role in supporting the national nuclear programme for sustainable development and is enhancing public awareness and understanding of the benefits of nuclear energy.

75. Under BKF/0/004, ‘Establishment of a National Nuclear Information Centre’, a fully operational centre was established, which now provides information and services to students, counterparts and research institutions. Joint training of fellows in Burkina Faso and Niger has resulted in strong cooperation between the beneficiary institutions, who exchange information to support the effective functioning of their respective national INIS centres.

C.2.3. Human health

Improving health services

76. Through a synergistic coordinated TC and PACT approach, the Agency helped Ghana to develop a 'bankable' project document to consolidate radiotherapy and nuclear medicine services at Korle Bu Teaching Hospital (KBTH), Accra; consolidate radiotherapy and establish a nuclear medicine facility at the Komfo Anokye Teaching Hospital (KATH) in Kumasi; and establish a radiotherapy and nuclear medicine facility in Tamale. The project document addressed all aspects of a National Cancer Control Programme, including prevention and early detection, expansion of nuclear medicine and radiotherapy and palliative care. The overall project required funding of \$22.5 million. With the support of TC and facilitation by PACT, the Government of Ghana has mobilized loans from the OPEC Fund for International Development (OFID) and the Arab Bank for Economic Development in Africa (BADEA). Together with its own contribution, the funds presently available to the Government amount to some \$13.6 million. The radiotherapy and nuclear medicine elements of the project are supported through GHA/6/015, 'Upgrading and Expansion of Radiotherapy and Nuclear Medicine Services' and the remaining activities will be supported through PACT and partners. Additional support in providing expert services will be available under regional AFRA projects.

77. In Mali, the newly established Nuclear Medicine Centre at Point G Hospital has improved its diagnostic and therapeutic capabilities following the delivery of a Dual-Head Gamma Camera to the Centre and the training of medical personnel under MLI/6/005, 'Upgrading of Nuclear Medicine'. As a result of the project, new therapy procedures are now available using rhenium-188 labelled radiopharmaceuticals. The quality of scintigraphic examinations has been enhanced and costs have been reduced considerably, thus making care services accessible to the general public. Healthcare for patients has improved, therefore reducing the need to seek expensive treatment abroad.

78. Nuclear medicine and radiotherapy in Libya has developed rapidly since the establishment of the nuclear medicine unit at the Tripoli Medical Centre (TMC). TMC is the largest referral hospital in the country and is also the teaching hospital for the medical faculty of El-Fateh University. Through LIB/6/003, 'Sustainability of Healthcare Services in Nuclear Medicine and Radiation Therapy', a total of 20 fellowships and one scientific visit have been implemented for nuclear medicine specialists (physicians), radiation oncologists and related healthcare workers. The qualified specialists now available are improving the quality of patient care.

79. In Nigeria, significant institutional capacities in nuclear medicine have been built in the University College Hospital of Ibadan (UCH-Ibadan) and the National Hospital of Abuja (NH-Abuja) under NIR/6/016 'Expanding Technical Capabilities in Nuclear Medicine Diagnosis' and NIR/6/012 'Upgrading Nuclear Medicine Services', providing much needed patient services. Treatment of gynaecological cancers, using high dose rate brachytherapy modality was initiated in Ibadan through NIR/6/017, 'Upgrading Radiation Oncology in the University College Hospital, Ibadan'. UCH, supported by the continued commitment of a philanthropist resident of Ibadan, Chief Afe Babalola, and a dedicated staff, has developed a fully fledged nuclear medicine centre in the country. Following Nigeria's recent decision to expand nuclear medicine and radiotherapy services at the national level, the same philanthropist is refurbishing and expanding the building at an estimated cost of over \$1.5 million. The planned phased expansion of nuclear medicine into ten national teaching/specialized hospitals, geographically distributed to provide convenient national coverage, is estimated to cost over \$30 million, with most of the required funding to come from the National Treasury.

80. An education and training programme for radiotherapy technologists (RTTs) was established in Dar es Salaam, Tanzania, under URT/6/021, 'Establishing Radiotherapy Education and Training Programme'. The programme was launched in collaboration with

Ocean Road Cancer Institute and Muhimbili University of Health and Allied Sciences (MUHAS) in August 2008. In the first intake, four self sponsored students joined the programme for a three year course leading to a BSc level qualification. Tanzania serves as one of the six PACT Model Demonstration Sites worldwide seeking to demonstrate the efficacy of comprehensive national cancer control programmes.

81. Under RAF/8/031 'Medical Physics in Support of Cancer Management (AFRA II-8)' and RAF/6/032, 'Promoting Regional and National Quality Assurance Programmes for Medical Physics in Nuclear Medicine (AFRA II-7)', medical physicists specializing in radiation oncology and nuclear medicine were offered training courses on networking technologies in radiation oncology, on nuclear cardiology, internal dosimetry, quality assurance and acceptance testing. The effectiveness and safety of nuclear medicine procedures for the implementation of quality assurance (QA) programmes in nuclear medicine at national levels was thereby improved. In February 2008, the First African Conference on Nuclear Medicine and Medical Physics took place in Khartoum, Sudan. AFRA Member States agreed to establish the African Association of Medical Physics, the first of its kind in the region.

82. The effectiveness of Vitamin A fortified table oil and Vitamin A capsule supplements is being assessed in Morocco under MOR/6/016, 'Nutritional Intervention Impact Assessment on Women and Children', which has a key focus on lactating women. The study is being carried out in health centres in low-income communities in Rabat, with the support of the government. Private sector partnerships are being established for refining and providing vegetable oil for human consumption. Strong collaboration exists with other UN organizations such as UNICEF and WHO.

83. In Mauritius, a more effective intervention approach for diabetic management was adopted under MAR/6/006, 'Management of Diabetes Mellitus', supporting an early diagnosis of diabetic complications. The prevalence of poorly

controlled diabetic illness has decreased noticeably, as has the number of cases of associated complications, and the treatment cost for diabetic patients. Capabilities in nuclear medicine to detect diabetic complications have been strengthened throughout Mauritius, and the expansion of radioimmunoassay services to the five regional hospitals and 25 health centres in Mauritius has begun. New clinical diagnostic services have been added to optimize the national nuclear medicine capability for improving the health care of patients suffering from *diabetes mellitus* and related complications. National guidelines were developed for early detection and prevention of diabetic complications.

C.2.4. Agricultural productivity and food security

Creating tsetse and trypanosomosis-free zones

84. The Agency continued to assist the Southern Rift Valley Tsetse Eradication Project (STEP) in Ethiopia throughout 2008. The Ethiopian Prime Minister's Office approved a new semi-autonomous management system for STEP and the civil construction work of the STEP Kaliti Tsetse Rearing and Irradiation Center (Kaliti Center) is nearly complete. The IAEA, as executing agency, and the Food and Agriculture Organization (FAO), as implementing partner, successfully implemented the second year of the programme, supported by the United Nations Trust Fund for Human Security. A second, larger pilot test on sterile male releases was carried out in a 100km² test area in the Arba Minch work area. It demonstrated that the intensive tsetse suppression efforts carried out had been very effective in reducing the number of tsetse flies present and that the test area was a good barrier to prevent the migration of tsetse flies.

85. Senegal made remarkable progress throughout 2008 towards creating a sustainable tsetse-free zone and is advancing towards the initiation of the operational phase of an area-wide integrated SIT programme with the objective of eliminating the tsetse fly *Glossina palpalis gambiensis* from the Niayes area (north

west of Dakar) and La Petite Côte (south east of Dakar).

86. Encouraging progress was also made by the Kenyan PATTEC initiative regarding the suppression of the *Glossina pallidipes* target population in the Lambwe Valley, adjacent to Lake Victoria: Using insecticide impregnated targets, apparent insect density has been reduced by about 90%. A colony of some 27 000 breeding females was established at the Trypanosomosis Research Centre of the Kenya Agriculture Research Institute (KARI-TRC). The current colony size is sufficient to initiate pilot releases, but needs to be increased substantially before the operational SIT phase can start.

87. The Government of Burkina Faso is committed to the elimination of the tsetse fly from the Mandoul area and a feasibility study supported by the Agency has been completed. This has resulted in a better understanding of the distribution, ecology, population dynamics and gene flow between the riverine tsetse fly populations of the different river basins. The data will serve as a baseline to assess whether an intervention strategy according to the area-wide principle can be applied for the creation of sustainable tsetse free zones in Burkina Faso.

Improving animal health and promoting livestock production

88. Animal health and production is of social and economic significance in Africa, and the TC programme has focused on developing a regional network of veterinary laboratories with the capability to produce and distribute critical diagnostic kits and provide early warning in case of disease outbreaks. Supported by the IAEA/FAO Joint Division, know-how and expertise were transferred to several African countries to help them monitor and control endemic cattle diseases more effectively and to advise their governments on action to take in case of outbreaks.

89. A number of AFRA Member States are benefiting from capacity building and the provision of basic equipment within the framework of AFRA project RAF/5/054, 'Improvement of livestock productivity through an Integrated Application of Technologies'. This

project is designed to develop and facilitate the application of appropriate selection criteria for genetically improved livestock. The project is making an important contribution on the interaction between nutrition and reproduction for improved productivity and in the use of artificial insemination to improve the productivity and reproductive efficiency of livestock in the region.

90. In Mauritania, under project MAU/5/002, 'Improving the National Capacity in Diagnostics for Animal Diseases (Infection and Parasitic Diseases)', the first national animal health laboratory was inaugurated in November 2008 by the Minister of Agriculture and Rural Development. The new facility is now fully operational, monitoring and controlling transboundary animal diseases, particularly foot and mouth disease and contagious bovine pleuropneumonia (CBPP).

91. Diagnostic capacities in the Central Veterinary Laboratories (LCV) in Bangui, Central African Republic, were strengthened under CAF/5/002, 'Assistance for Epidemiological Surveillance of Animal Diseases', enabling the diagnosis, monitoring and control of animal diseases, particularly contagious bovine pleuropneumonia and trypanosomosis. National capacity in the use of Enzyme Linked Immunosorbent Assay (ELISA) and polymerase chain reaction (PCR) technologies for CBPP diagnosis and a basic capability for the diagnosis and monitoring of trypanosomosis was established. The laboratory's epidemiological knowledge of major livestock diseases has been improved.

92. A tick borne diseases laboratory was established in Sudan under SUD/5/029, 'Characterization and Quality-assured Production of an Attenuated *Theileria Annulata* Vaccine'. It is capable of both producing and monitoring the quality of this very important vaccine. Sudan now has a well established molecular diagnostic capacity, employing the new loop-mediated isothermal amplification (LAMP) technique. With the ability to produce vaccines to control tropical *Theileriosis* and tick borne diseases (TBDs), Sudan is being

recognized as a country with healthy livestock practices and is following the International Office of Epizootics (OIE) pathway.

93. Under SUD/5/030, 'Increasing Productivity of Selected Crops Using Nuclear Related Techniques', Sudan made major progress in identifying innovative water and nutrient management technologies to improve irrigation water use and enhance crop productivity. Two rhizobia strains were isolated, purified, and are being tested for commercial production of bio-fertilizers for high production of sugarcane. Newly-developed mutant crop varieties were successfully tested for their enhanced adaptability to drought and high nutrient use efficiency. In addition, targeted stage continuous sampling method for estimating soil water in heavy-textured (clayey) soils is developed and compared with those obtained from soil moisture neutron probe.

94. Through past and current TC projects (e.g., KEN/5/026, 'Isotope Techniques for Assessment of Water and Nitrogen Use Efficiency in Cowpea and Maize Intercropping Systems', and KEN/5/030, 'Assessing Nutrient and Moisture Use in Major Cropping Systems'), the Kenyan Agricultural Research Institute (KARI) has developed and built up capabilities in soil fertility management, soil water monitoring, agricultural water harvesting and formulating fertilizer recommendations (both organic and mineral fertilizers) on maize and bean yields in Kenya. KARI is playing a major role as a centre for regional training in soil and water management and also as expert providing training in many African countries. Kenya is also involved in the new regional project RAF/5/058, 'Enhancing the Productivity of High Value Crops and Income Generation with Small-Scale Irrigation Technologies', and is hosting the first coordination meeting to be held in March-April 2009.

Improving crop productivity and combating agricultural pests

95. In Madagascar, under MAG/5/008, 'Mutation Techniques and Biotechnology for Rice and Cassava', a national capability was established at the Laboratoire de Physiologie Vegetale, University of Antananarivo, for the use of induced mutation techniques coupled with other cultural methods for production of mutants with improved low temperature and drought tolerance, plant height reduction, earliness, and disease resistance. Ten promising indigenous rice varieties have been studied in laboratory, greenhouse and field research experiments.

96. South Africa continued to expand the use of SIT against the fruit pests in the Western and Northern Cape under SAF/5/007 'Expanding the Use of the Sterile Insect Technique against Fruit Pests in the Western and Northern Cape'. This project built on a successful earlier TC project on the 'Establishment of Medfly Mass-Rearing Facility and Introduction of Pilot Sterile Insect Technique Control Programme', which rapidly reached its major objectives, and sustainability in terms of attracting private sector partners. Under the new project SAF/5/007 activities were expanded to other fruit pests: the codling moth, a major pest of apples and pears, and to the false codling moth, a pest of citrus and other crops. Thanks to the convincing results achieved under a successful pilot project, significant private sector involvement has resulted in the establishment of a large false codling mass rearing facility and increased acceptance of the SIT methodology to for the integrated control of these other fruit crops.

97. In Tunisia, TUN/5/023, 'Radiation-induced Mutations for Improvement of Cactus', had positive results after the molecular morphological and nutritive characterizations of the national germ-plasm for various traits were carried out. Research papers on tissue culture are being generated, the adoption rate among farmers is increasing and extension activities are continuing. The growth rate of most clones is extremely high. A nursery established in the south east of Tunisia will provide cladodes that will be planted in other private farms.

C.2.5. Water resource management

Assisting Member States in managing water resources

98. In Algeria, under ALG/8/012, ‘Sustainable Management of Groundwater Resources’, isotope methods were used together with conventional techniques to investigate the hydrodynamics and recharge conditions of the aquifer systems in the Mostaganem plateau and the Sidi Bel Abbés Wilaya, assessing the impact of increased groundwater exploitation on the seawater interface and the vulnerability to pollution of groundwater resources in Chott El Hodna (M'Sila Wilaya). Experience gained in this project should enable a better understanding, protection and sustainable management of water resources in the coastal areas of Algeria.

99. The technical report of UGA/8/004, ‘Isotopes in Management of Town Water Supplies in South-Western Uganda’, produced a water balance assessment and defined recharge areas with recommendations that could be used by the Ministry of Water Resources for groundwater protection in the area. The project addressed the issue of increasing demand for water in Rukungiri town and sustainability of the groundwater resource. The study showed that the aquifer has a limited, local extent and over-exploitation is a serious concern. Results of this study will allow the local authorities to manage the aquifer carefully to meet water demands.

C.2.6. Industrial applications

Developing national capabilities for industrial quality control

100. In Cameroon, Agency support in 2008 under CMR/8/007, ‘Sustainability and Institutional Self-Reliance in Non-Destructive Testing Capability, Phase II’, has consolidated previous achievements regarding the ability to train and provide certification and services to the industry, thereby paving the way towards institutional self-reliance. The counterpart institution, HYDRAC, recently obtained accreditation and can generate a significant portion of its income from Non-Destructive Testing (NDT) services.

101. National capability has been established at CREN-K in the Democratic Republic of the Congo to conduct inspection and training in NDT services that include all five NDT methods at a reasonable cost, under ZAI/8/014, ‘Establishment of an Industrial Non-Destructive Testing Capability Phase II’. The capability established is also being used to train NDT technicians from various industrial companies.

102. Under RAF/8/044, ‘Radiation Processing for Human Health’, 16 countries received assistance to establish radiation processing technology using natural polymers for use in the health and environmental sector. The National Centre for Radiation Research and Technology (NCRRT) of Egypt became an AFRA Regional Designated Centre (RDC) to provide services and training to AFRA countries in the field of radiation technology. Partially supported through national projects (EGY/8/019, ‘Radiation Processed Hydrogels for Agricultural and Industrial Applications’, and EGY/8/020, ‘Development of Natural Materials for Industrial Applications with the Aid of Ionizing Radiation’) NCRRT is now a well equipped laboratory for material development and characterization, microbiology and dosimetry.

C.2.7. Sustainable energy development and planning

103. Several African Member States are considering launching nuclear power programmes and have sought Agency assistance in studying the feasibility of introducing nuclear power in their national energy mixes. Agency assistance is being provided at different stages to countries including Algeria, Egypt, Ghana, Libya, Nigeria, Morocco, and Tunisia. Ongoing projects focus on topics such as increasing awareness of the requirements for feasibility studies regarding nuclear power programmes and establishing or strengthening the nuclear infrastructure necessary for the introduction of nuclear power. Algeria, Egypt, Ghana and Nigeria have received assistance in familiarizing national counterparts with the IAEA guidelines in the Agency publication ‘Milestones in the Development of a National Infrastructure for Nuclear Power’.

104. Under an AFRA project, the Agency is helping 29 Member States in the region to build local capacities for sustainable energy development. Seven training events were organized during 2008 through which more than 80 energy analysts were trained. Some of these events were organized for French speaking countries, for which all the training materials and the computer models were converted to French. The project is producing tangible results as i) there is a strong realization at the policy level of the importance of the long-term energy planning studies based on quantitative analyses of all possible energy options for securing affordable and clean energy supplies, ii) a pool of energy professionals with analytical skills in energy planning has been created who are contributing to the national energy planning efforts. To promote further TCDC modalities, AFRA Member States have taken appropriate steps towards the establishment of regional resource centres to provide training and capacity building support to the energy professionals from the African Member States. Two institutions have already been pre-selected as part of the process.

105. Assistance to Sudan continued under SUD/0/011, 'Exploring the Best Options for Sustainable Energy Development', which aims to help government officials develop a strategy for the consideration of the introduction of nuclear power for electricity generation and high level officials and relevant stakeholders have been sensitized on the requirements for developing a strategy to introduce nuclear power in accordance with Agency guidelines. Tanzania has significantly strengthened its planning capabilities for sustainable energy development through active participation in RAF/0/028, 'Strengthening Planning Capabilities for Sustainable Energy Development (AFRA VI-1)'. The training of national energy planning teams in Burkina Faso, Chad and Côte d'Ivoire was completed with additional hands-on training on the planning model through regional training events and group fellowships on the model MESSAGE.

Waste management

106. Tanzania has established a central waste storage facility under URT/9/004, 'Safety and

Licensing of Radioactive Waste Management'. This has allowed the Tanzanian Atomic Energy Commission to collect disused and orphan sources from different parts of the country, and to condition and store them securely.

C.2.8. Safety and security

Legislative assistance and strengthening radiation and waste safety infrastructure

107. Several African Member States have received assistance to develop and/or update their legislative frameworks to comply with the most recent international safety and security obligations under regional project RAF/0/015, 'Legislative Assistance for Safe and Peaceful Uses of Nuclear Energy'. Such assistance was delivered through national and regional workshops, direct bilateral assistance as well as the training of several fellows. Supported by the technical cooperation programme, a number of national experts also attended the International School of Nuclear Law, Montpellier, France.

108. Throughout 2008, Member States received extensive assistance in upgrading radiation protection infrastructures within the framework of regional projects RAF/9/031, 'Strengthening National Regulatory Infrastructure for the Control of Radiation Sources' and RAF/9/032, 'Development of Technical Capabilities for the Protection of Health and Safety of Workers Exposed to Ionizing Radiation'. Ethiopia, Ghana, and Nigeria benefited from this assistance, and Botswana, Kenya, Morocco, Niger, Sudan and Tanzania achieved the requirements for Milestone one in radiation protection infrastructure. Five regional training events addressed Member State needs in priority areas such as prevention of accidental exposures in radiotherapy, radiation protection in diagnostic and interventional radiology, safety of radioactive waste management, authorization and inspection of medical radioactive sources, and planning and response to a radiological emergency. The Third Post-graduate Educational Course (in French) on Radiation Protection and on the Safety of Radiation Sources was successfully held in Rabat, Morocco, under RAF/9/035, 'Education and Training in Support of Radiation Protection Infrastructure'.

109. Twenty-eight regulators from 15 African Member States built capacities for strengthening national regulatory infrastructures through a successful regional training programme conducted under RAF/9/031, supported with extrabudgetary assistance from the United States Nuclear Regulatory Commission. The government of Spain also provided extrabudgetary support to strengthen national regulatory infrastructure in North African countries. This enabled the organization of several training and meeting events, including two policy level experience exchange seminars in Cairo and Tunis. Experience in the development of regulatory systems was exchanged with senior authorities of the Spanish regulatory body.

110. Assistance to the Democratic Republic of the Congo (DRC) continued under ZAI/9/009, 'Enhancing Regulatory Supervision and Safety of CREN-K Research Reactor', resulting in improvements to the safety and security of the reactor fuel, spent fuel storage facilities and premises. The implementation of the Action Plan adopted by the IAEA and the DRC to enhance the safety and security of the research reactor facilities is progressing smoothly.

111. The NIR/0/006, 'Establishment of a National Postgraduate Centre in Radiation Protection' has enabled Nigeria's National Institute of Radiation Protection and Research at the University of Ibadan to offer a Postgraduate Diploma and a Masters Degree in Radiation Protection. The first student intake was in October 2007, and the second intake is now being admitted.

Nuclear security

112. Supported by the Nuclear Security Fund (NSF), assistance to African Member States in nuclear security implementation continued under AFRA project RAF/9/036, 'Nuclear Security Implementation Support (AFRA I-5)'. Regional training activities were increased to cover all nuclear security areas of high relevance to the region, including training of law enforcement agencies in some aspects of illicit trafficking, physical protection of nuclear installations, detection and prevention of malevolent acts and management of radioactive sources. Support was also provided to update national legislation in order to incorporate nuclear security obligations.



Searching for radiation sources at an abandoned storage facility in Kenya

C.3. Asia and the Pacific

C.3.1. Asia and the Pacific region at a glance

113. In 2008, the Agency provided technical assistance to 30 countries in Asia and the Pacific¹⁶, four of which are Least Developed Countries. Net new obligations amounted to \$19.0 million and the financial implementation rate was 62.2%. The distribution of disbursements in the region for 2008 by area of activity is shown in Fig. 6. The volume of delivery and the financial implementation rate would have been much higher had it not been for the unfavourable security/political situation and natural disasters in several countries in the region, which restricted or prevented implementation activities in general and in particular the fielding of expert missions and placement of fellows.

114. Throughout 2008, activities in the Asia and the Pacific region focused on strengthening the technical and scientific capacities of the national and regional nuclear institutions and resource centres in major socioeconomic sectors such as human health, agriculture, environment protection and energy. Special emphasis was given to providing assistance for comprehensive nuclear power planning and development with focus on capacity building in general but in particular for safety and security. Other key areas of focus, in line with national and regional priorities, included enhancing food security, improving animal health, improving water resources management, safe operation of nuclear power plants and other nuclear installations and enhancing radiation safety.

- Target for voluntary contributions to the TCF from countries in the Asia and the Pacific region **\$20.9 million**
- Disbursements for the TC programme in Asia and the Pacific **\$20.4 million**
- Net new obligations in Asia and the Pacific for 2008 **\$19.0 million**
- Implementation rate for the programme **62.2%**
- Number of countries and territories receiving support **30**
- Expertise was provided and exchanged through **792** expert and lecturer assignments, and between **734** meeting participants
- Training was provided to **684** participants in training courses and **404** fellows and scientific visitors

¹⁶ The Agency's technical cooperation with Iran has continued in accordance with document GOV/2007/7 as approved by the Board on 8 March 2007 as well as with the mechanisms which the Secretariat has put in place to ensure that all Agency cooperation with Iran is in compliance with UN Security Council resolutions 1737(2006), 1747(2007) and 1803(2008).

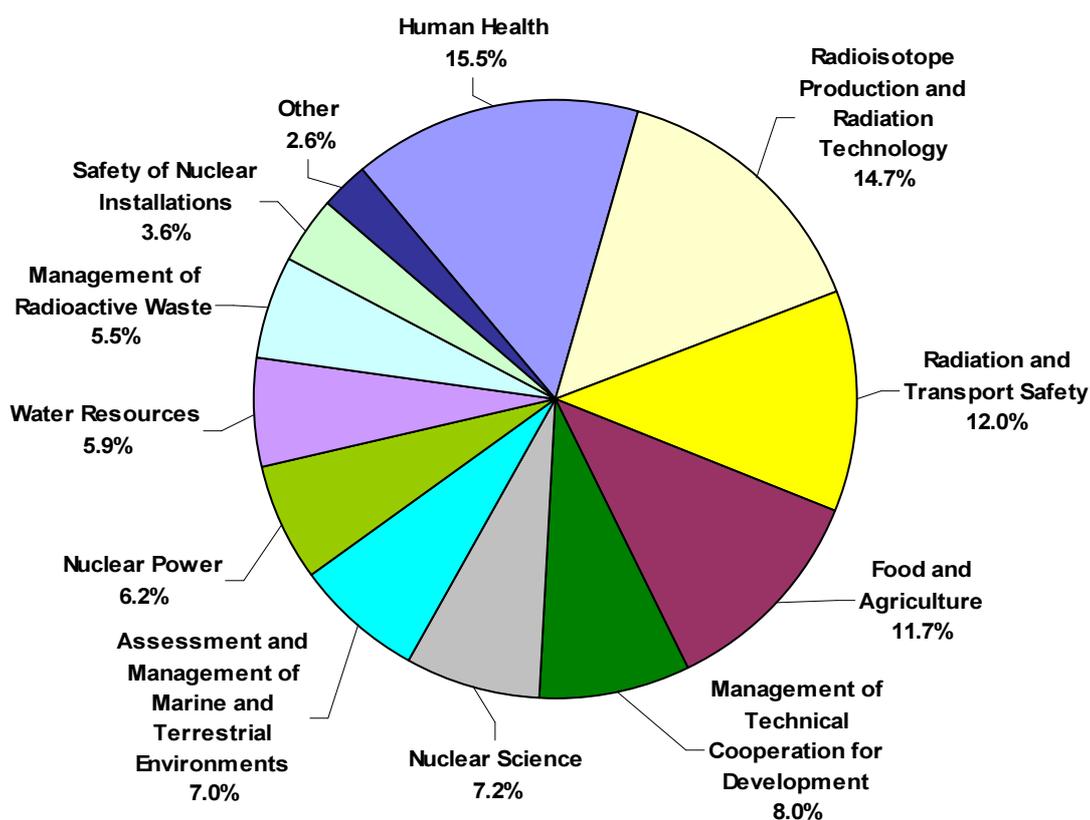


Figure 6: Disbursements by Agency Programme for 2008 – Asia and the Pacific

C.3.2. Human resource development

115. The Asian Network for Education in Nuclear Technology (ANENT) continued to be a vehicle for cooperation in nuclear education and training in nuclear technology for the Asian region. Under RAS/0/047, ‘Supporting Web-Based Nuclear Education and Training through Regional Networking’, with 24 countries participating, the ANENT Cyber Educational platform was further enhanced with new courses and other educational materials and resources. In 2008 and 2009, 34 specialists from the region were trained through regional courses to use the cyber platform to conduct training courses and find educational materials and other resources for nuclear education.

C.3.3. Human health

Health care

116. Several TC projects to improve the quality of health services in countries in the Asia region continued in 2008, including activities to

strengthen nuclear medicine and diagnostic techniques for the management of cancer. The main emphasis was on establishing cyclotron and positron emission tomography (PET) centres. In collaboration with the Programme of Action for Cancer Therapy, assistance was provided in formulating comprehensive strategic plans for national cancer control in Sri Lanka, Vietnam and Yemen.

117. Thirteen centres in China, Malaysia, Philippines and Thailand have adopted new positron emission tomography/computed tomography (PET/CT) application techniques in oncology, introduced through RCA project RAS/6/042, ‘Tumour Imaging using Radioisotopes’. Twelve centres in China, Indonesia, Malaysia, Philippines, Thailand and Vietnam have introduced new techniques for Sentinel Lymph Node Detection in their breast cancer management programmes. A total of 108 people attended regional training courses in PET/CT, Sentinel Lymph Node Detection with Nuclear Medicine Techniques, Nuclear

Oncology Applications of SPECT, PET Applications for Oncologists, Radiation Oncologists and Haematologists and Positron Emission Tomography Applications in Clinical Management of Cancer Patients and 700 people benefited from national training courses.

118. Radiotherapy services in Member States in the region improved thanks to RCA project RAS/6/040, 'Improvement in Quality of Radiotherapy of Frequent Cancers in the Region'. Most participating Member States have established quality assurance programmes and are upgrading them to accepted international standards. Quality Assurance Team on Radiation Oncology (QUATRO) audits carried out in the main radiotherapy centres of eight Member States have provided comprehensive information to help Member States identify actions to improve the quality of radiotherapy services. One hundred and thirty professionals were trained in brachytherapy treatment for common types of cancer in the region under the project

119. In Indonesia, under INS/6/013, 'Strengthening the Knowledge and Capacity of Medical Physicists in Indonesia', medical physics education was strengthened through a review of the medical physics Masters programme at the University of Indonesia. Laboratories were equipped and lecture staff were trained, and a number of training events for medical physicist practicing in Indonesia were held. These events included the strengthening of clinical training on quality assurance in radiotherapy.

120. TC project THA/6/033, 'Establishing Cyclotron Facility and PET Centres', played a key role in the improvement of the Thai national programme for cancer treatment, by facilitating access to improved health care and medical diagnostics using nuclear medicine techniques, and perfecting professional experience in these fields. Under THA/2/011, 'Development of Radiopharmaceuticals for Clinical Use', the Agency provided technical assistance on the development of radiopharmaceuticals for clinical use.

121. In Syria, under SYR/4/010, 'Production of Diagnostic and Therapeutic

Radiopharmaceuticals Using a Cyclotron', the Syrian counterpart continued efforts to upgrade and improve existing cyclotron and related facilities for the production and distribution of radiopharmaceuticals for medical use, thus expanding radiopharmaceuticals production and supporting the Syrian endeavour to promote Good Manufacturing Practices (GMP) in the production of radiopharmaceuticals. Agency support to improving radiopharmaceutical production contributed to the project's achievements in producing additional isotopes, which have been supplied to Syrian hospitals since January 2008. Several new products have also been produced under SYR/2/004, 'Upgrading Technetium-99m Generator Production and Labelling Compounds'.

122. The seven countries that form ARASIA have increased the capacity to train medical physicists within the region through the strengthening of the Master's medical physics programme at the University of Jordan. The project RAS/6/052, 'Upgrading Medical Physics Services in the ARASIA Member States through Education and Training', was used to equip laboratories and evaluate the programme as well as to sponsor a regular intake of students from the participating States. The first intake has completed the programme.

123. In Iran, TC project IRA/2/006, 'Developing Technetium-99m Labelled Radiopharmaceutical Kits Based on Monoclonal Antibodies and Peptides' enabled the counterpart institute to produce a specialized class of radiopharmaceutical kit, based on monoclonal antibodies and peptides. Special training was provided on radiolabelling and evaluation of monoclonal antibodies for imaging, as well as technical advice in the fields of monoclonal antibody production, technetium-99m labelling of antibodies and quality control. Capacity to meet the demand of the national nuclear medical centres for radiopharmaceuticals for cancer diagnosis has improved.

124. The first Nuclear Medicine Centre in Yemen was opened early 2008 in Al-Thawra General Hospital in Sana'a, supported through YEM/6/004, 'Establishment of a Nuclear

Medicine Centre at Al-Thawra Hospital in Sana'a'. The centre became fully operational in July 2008. The Centre is now able to provide services to many of the 23 000 patients per year requiring cancer, renal and cardiology diagnosis. The project has helped the Centre to become the nucleus of a national training centre for nuclear medicine in Yemen.

C.3.4. Agricultural productivity and food security

Increasing agricultural productivity and the export of commodities

126. Increasing agricultural productivity and enhancing food safety remained a priority in the Asia and the Pacific region during 2008.



Diagnosis with a Double-Head Gamma camera at the Nuclear Medicine Centre in Al-Thawra General Hospital, Sana'a, Yemen

125. TC project KUW/1/002, 'Establishment of a Secondary Standard Dosimetry Laboratory (SSDL)', was successfully concluded in 2008. The project assisted in establishing national calibration capabilities in Kuwait to cover calibration needs for radiation protection instruments. A core group of trained staff are now capable of providing reliable calibration services, as demonstrated in the international dose quality audit of caesium-137 calibrations using thermoluminescence dosimetry. In view of the good results obtained in the international dose quality audit, the Kuwaiti SSDL was nominated as a member of the IAEA/WHO SSDL network.

127. A regional training course on Protein Bait Technology for Suppression of Tephritid Fruit Flies as part of SIT application under RAS/5/049, 'Sharing Regional Knowledge on the Use of the Sterile Insect Technique within Integrated Area-Wide Fruit Fly Pest Management Programmes', was conducted in Hanoi, Vietnam in September, 2008. It was attended by 23 participants from 12 countries. The course provided information on the latest developments in protein bait technology based on the utilization of local yeast waste products, as well as training in the use of the technology. Another course, under the same project, on Pest Risk Analysis in Support of Fruit Fly Management and SIT Application took place in

October 2008 in Amman, Jordan with 26 participants from 16 countries. The course provided information on pest risk analysis, including terminology, pest categorization, and assessment of the probability of introduction, establishment and spread of fruit fly pests as well as impacts and economic consequences.

128. Livestock feeding strategies developed by the RCA Member States participating in the project RAS/5/044, 'Integrated Approach for Improving Livestock Production Using Indigenous Resources and Conserving the Environment', resulted in increased weight gain and milk production in dairy animals. An increase in milk yields of approximately 25% was observed in Bangladesh, and Bangladesh, China, Indonesia, Myanmar and the Philippines reported an increase in the average daily weight gain of animals ranging from 15–70%. The reduction in methane emissions due to adoption of the new feeding strategies in Bangladesh, China, Indonesia, Pakistan and Thailand ranged from 15-70%. Almost all the project participants achieved genetic improvement in their livestock using different reproductive techniques. Most Member States have designed and applied standardized criteria to select better breeding heifers based on recording parental performance.

129. In Bangladesh, TC project BGD/5/026, 'Increasing Agricultural Production in the Coastal Area through Improved Crop, Water and Soil Management', led to the identification of two short duration and salt tolerant/escape varieties of rice and two varieties each of mung bean and chickpea. The varieties were evaluated by 'champion farmers' using different water management systems. Once validated, registered and disseminated, the improved varieties, in partnership with a water management system, will help to enhance food security by ensuring year-round utilization of the land and reducing soil nutrient mining. The legumes will also improve human nutrition and soil regeneration.

130. In the regional project RAS/5/043, 'Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Soil and Water Quality', fallout radionuclide (FRN) technology has been

successfully used by 14 Member States from the East Asia and Pacific region (Australia, Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam) to assess soil erosion, evaluate soil conservation measures and better understand the relationship between soil redistribution and soil quality. The cross-departmental and interdisciplinary approach (collaboration between nuclear and soil science institutes) used by most participating Member States was one of the key reasons for this success. The expertise gained through regional project RAS/5/043 can be used to further train scientists and technicians from the region. The proficiency test shows that the current analytical resources in the East-Asia and Pacific region are sufficient to further successfully implement FRN technology. Partnerships have been established between participating institutions and end-users, leading to the formulation and execution of development projects to enhance the adoption of improved soil conservation and water management practices.

C.3.5. Water resource management

131. The ARASIA TC project RAS/8/103, 'Use of Isotopes and Geochemical Techniques in the Study of Artificial Recharge in Groundwater (ARASIA 3)', has helped seven countries in the Middle East to assess the feasibility of applying artificial recharge schemes in order to replenish stored water and prevent the decline of water tables. The main focus was to produce a critical assessment of methodologies and the effectiveness of applied schemes and to develop the capacities needed for sustainable management of water resources in the participating countries. A regional study with scientific data collected during the lifetime of the project from the participating ARASIA Member States was completed, outlining the project's achievements and making several recommendations to the stakeholders involved.

C.3.6. Environmental protection

Marine environmental management

132. In Jordan, assistance was provided under JOR/7/005, 'Assessment of the Marine Radioactivity in the Area of the Gulf of Aqaba (Phase II)', to strengthen national capabilities to monitor and assess levels of anthropogenic radionuclides and naturally occurring radioactive materials in the marine environment of Aqaba Bay. A sampling mission in the Gulf of Aqaba took place in March 2008 to produce first data on marine radioactivity in the Jordanian area of the Aqaba Bay. The data will be used in a baseline study to optimize the location of sampling sites for the monitoring programme. Sampling was carried out by the Jordanian Atomic Energy Commission in collaboration with the Marine Science Station (MSS) of the University of Jordan/Yarmouk University from Aqaba and the Interuniversity Institute for Marine Sciences of the Hebrew University of Jerusalem at Eilat. Water and sediment samples were collected from six stations and are currently being analysed in Jordan with continued analytical support from the Agency.



The chartered vessel "Seabell" carrying out water sampling in Aqaba Bay, Jordan

C.3.7. Industrial applications

133. As a result of the RCA project RAS/8/100, 'Advanced Industrial Radiography', and previous RCA projects on non-destructive testing, all but three of the 15 participating Member States have established National Qualification and Certification Schemes for NDT personnel based on the international standard ISO 9712. The other three Member States are expected to achieve this in 2009. All but two participating Member States have established National Certification Bodies, a requirement under ISO 9712. Six Member States have obtained accreditation for the NDT laboratories in accordance with ISO 17025/ISO 17020. The basic infrastructure for accreditation of the laboratories exists in three other Member States. Annually, the participating RCA Member States train some 2500 persons in the five major NDT methods.

134. RCA Project RAS/8/099, 'Radioisotope Technology for Natural Resource Exploration and Exploitation', has made it possible for China, Pakistan and Vietnam to use the Interwell Tracer Test (IWTT) technique in the petroleum industry. Most RCA Member States participating in this and previous RCA projects on industrial radioisotope technology can now routinely use gamma column scanning and radiotracer techniques for troubleshooting. Several RCA Member States are developing prompt gamma neutron activation analysis (PGNAA) and process gamma tomography for the applications in the petroleum, chemical and mineral industries.

C.3.8. Sustainable energy development

135. An increasing number of Member States in the Asia and the Pacific region are considering nuclear power as part of their electricity and heat generation options. Some have already decided to introduce the first nuclear power plant or to expand existing programmes. In 2008, the Agency provided advisory assistance on the development of nuclear power, through familiarising national counterparts with the IAEA guidelines in the publication 'Milestones in the Development of a National Infrastructure

for Nuclear Power'. The Agency also helped seven countries in the Middle East to carry out a comparative assessment of electricity generation options through ARASIA TC project RAS/0/043, 'Comparative Assessment of Electricity Generation Options (ARASIA 1) (Formerly RAW/0/014)'.

136. In 2008, support to Member States with nuclear power plants was provided under national projects as well as through two regional projects, RAS/4/028, 'Integrated Management Systems for Expanding Nuclear Power Programmes', and RAS/9/044, 'Proactive Management of Operational Safety at Nuclear Power Plants and Utility Organizations with Expanding Nuclear Programmes', which aim to improve nuclear power plant (NPP) management systems, including the coherent integration of safety, quality, security, health, production, human resources and environmental aspects, thus ensuring long term success in the implementation of nuclear power. Several expert missions, meetings and training courses were arranged in China, Pakistan and the Republic of Korea.

137. Under RAS/0/045, 'Formulation of Sustainable Energy Development Strategies in the Context of Climate Change', the Agency supported national energy studies in 15 countries to evaluate the possible impacts of climate change control options on the choice of energy technologies for sustainable energy supplies. An advanced training course was conducted during 2008, attended by 24 energy analysts, to provide training on modelling climate change control options within energy analyses.

138. The Agency continued to assist the Gulf Cooperation Council (GCC) with the introduction of nuclear power in GCC countries. An IAEA team visited Riyadh in May 2008 to discuss Agency support to the recommendations of the 2007 feasibility study on the implementation of a nuclear energy programme. In June 2008, the GCC Secretary General requested Agency support for the preparation of the reference framework for a number of studies. The requested reference framework was developed by the Agency and discussed with GCC Officials in December 2008. As an

outcome, a report that provided the terms of reference for building the necessary infrastructure for nuclear power programmes in GCC countries was finalized and presented to the GCC Secretariat.

139. An expert mission under BGD/0/008, 'Human Resource Development and Nuclear Technology Support', took place in November to review Bangladesh's nuclear power infrastructure. The mission paved the way for subsequent Agency support in the areas of site safety analysis reports, legislation, bid invitation specifications, emergency preparedness and safeguards. In Indonesia, under INS/4/033, 'Preparation for a Nuclear Power Plant', a Workshop on Technology Assessment enhanced national capacities to prepare and introduce a nuclear power programme, helping the country to assess relevant options and scenarios for the introduction of such a programme in the near future.

140. Vietnam's Strategy for Peaceful Utilization of Atomic Energy up to the Year 2020 provides for the construction and operation of the first nuclear power plant in the year 2020. In June 2008, the National Assembly approved the Atomic Energy Law. In order to complete the preparatory work before inviting bids for construction of the first NPP, concerted national efforts and close international cooperation, especially technical support from the Agency, are essential requirements. TC project VIE/0/010, 'Technical Support for Training in Nuclear Engineering at the Hanoi University of Technology', aims to strengthen the capabilities of the nuclear engineering department at the Hanoi University of Technology' (HUT). In 2008 a group of senior lecturers from the University visited Korea to initiate bilateral cooperation with Korea's Advanced Institute of Science and Technology on developing a curriculum for a Nuclear Engineering degree in Vietnam at HTU and to develop a cooperative programme between the two universities. The Agency played a catalyst role by promoting this bilateral cooperation.

141. The United Arab Emirates (UAE) has launched a white paper on their policy for considering nuclear power as a part of their electricity generation option. A workshop was held in Vienna in 2008 under UAE/0/005, 'Human Resources Development and Nuclear Technology Support'. Agency comments and recommendations were sought on the draft roadmap for the implementation of a nuclear power programme and nuclear law.

142. Agency assistance to Jordan was provided under JOR/4/005, 'Technical and Economic Feasibility Study for a Nuclear Power and Water Desalination Plant'. Jordanian fellows were trained in energy demand analysis, and a mission was organized for Jordan national experts to visit various organizations in the USA for technology assessment.

C.3.9. Safety and security

143. The safe, reliable, and effective operation of nuclear power plants and other nuclear installations are a priority area for technical cooperation in the Asia and the Pacific region. Expert missions, workshops and training courses were arranged to improve operational safety, reduce occupational radiation exposure, enhance the required nuclear safety regulatory regime and managerial competencies, improve plant performance, and establish safety culture in nuclear facilities. Technical cooperation in nuclear security continued for the implementation of the Agency's Nuclear Security Plan, leading to the improvement of nuclear security infrastructure in Member States, as well as the institutionalization of mechanisms to stop illicit trafficking of nuclear and radioactive materials.

144. In Pakistan, PAK/9/030, 'Applicability of IAEA Nuclear Safety Standards for Nuclear Power Plants (Phase II)', concentrated on human capacity building and the development of tools for the review of safety analysis reports for Nuclear Power Plants. The capability of the staff of the Pakistan Nuclear Regulatory Authority (PNRA) in reviewing Safety Analysis Reports for NPPs was increased.

145. Assistance provided in 2008, under PAK/9/026, 'Improving Safety Features of Karachi Nuclear Power Plant, Phase II', has helped NPP KANUPP to make significant progress in assuring the safety and integrity of its fuel channels. In-Service Inspection and Fitness for Service Assessment of the Fuel Channels have been conducted in accordance with Canadian regulations/standards with the aim of ensuring the continued integrity of the core as long as the plant remains operational. In addition, good progress has been made in the development of KANUPP's Safety Parameter Display System (SPDS) which was independently reviewed by external experts, and will be integrated into the Emergency Operating Procedures now under development. KANUPP is also making progress in other safety areas: of 20 approved Safety Cases (cases that require Canadian assistance and are approved by the International Steering Committee) 11 have been closed and 9 are ongoing, with a high probability of achieving the goals in 2009.

146. Under IRA/4/035, 'Strengthening Owner's Capabilities for Commissioning and Start-up of Bushehr Nuclear Power Plant', Agency assistance to Iran's Bushehr Nuclear Power Plant (BNPP) continued to focus on supporting the owner organization and the Iranian National Regulatory Authority (INRA) in order to strengthen their safety and security related capabilities for fulfilling their respective functions in a number of critical areas. These included safety analysis, licensing, preparations for commissioning, physical protection and emergency planning. The assistance provided during 2008 contributed positively to the successful drafting of an on-site as well as an off-site emergency plan for Iran's first nuclear power plant. In addition, Agency assistance facilitated the completion of the review process of chapter 15 of BNPP's Final Safety Analysis Report (FSAR) on accident analyses, an important step needed for the timely issuance of the plant's commissioning licence.

Disused and orphan radioactive sources

147. TC project CPR/9/038, 'National Strategy for Regaining Control over Orphan, Vulnerable and Disused Radioactive Sources in China', helped China to develop practical skills for the recovery of orphan sources and to build national capacity to strengthen control over vulnerable and disused sources in the country. Various project activities conducted over the past two years enhanced the capacity of counterpart institutions in carrying out search and secure operations for orphan radioactive sources. Following the earthquake in May 2008, a search for radioactive sources in Wenchuan County, Sichuan Province, was carried out. The search teams were able to locate and recover some dozen sources in the disaster area.

radiation equipment training, as well as field exercises to recover hidden sources. Emphasis was placed on the practical techniques necessary to identify the radionuclide, measure the radiation field and estimate the amount of radioactivity present and, consequently, to estimate the required shielding. The participants are now ready to train the remainder of their search team, utilizing the specialized radiation detection equipment provided to Iraq under IRQ/9/006. Iraq now has the capacity necessary to mobilize a trained and equipped search team to locate and bring under regulatory control, orphan sources in Iraq.



Searching for orphan sources after the May 2008 earthquake, China

148. A Train-the-Trainers course was held in Amman for 15 Iraqi participants under IRQ/9/006, 'Regain Control over Orphan Sources'. Participants were provided with the knowledge and practical skills needed to maintain a verified inventory and national strategy for orphan source recovery in Iraq. The training course consisted of lectures, tabletop exercises, team projects, and specialized

Radioactive waste management

149. The increasing spread of nuclear applications in health, agriculture, and industry made the management of low and intermediate radioactive waste a priority for countries in the Asia and the Pacific region during 2008. Technical cooperation, in this area, aimed to ensure the safe and secure storage and disposal of radioactive waste in accordance with

international standards. Upgrading the infrastructure for the management of radioactive waste in the countries of the region was also an area of focus of the programme.

150. Two regional workshops, two training courses and a consultation meeting were held in 2008 under regional project RAS/3/009, 'Strengthening Infrastructure for Radioactive Waste Management', which aimed to establish or upgrade radioactive waste management (RWM) infrastructure in the countries of the Asia and Pacific Region in accordance with international standards. The project focused in 2008 on technical methods to identify disused sealed radioactive sources in the region and manage them in a safe, effective and secure manner, and provided assistance on the preparation of strategic action plans for national and regional implementation. Participating States were provided with information on developing and implementing national policy and strategy for radioactive waste management, as well as on international best practices in radioactive waste management. The training focused on the Radioactive Waste Management Registry (RWMR) software application, emphasising the importance of record keeping in predisposal waste management practices, especially regarding the management of disused sealed radioactive sources.

151. Personnel from the Palestinian Energy Authority (Hebron, West Bank) were trained in sampling and determination of radionuclides in environmental samples at the Department of Radiation Protection and Nuclear Safety of the Atomic Energy Commission of Syria (AECS), in Damascus, Syrian Arab Republic, within the frame of PAL/7/002, 'Strengthening Environmental Monitoring Capabilities'. Quality control and quality assurance systems were also included in the course.

152. Support to the Waste Management Capability of Pakistan Atomic Energy Commission and Pakistan Nuclear Regulatory Authority, which are responsible for predisposal and for licensing of radioactive waste management, respectively, was provided under PAK/3/011, 'Strengthening the Infrastructure for

the Management of Radioactive Waste'. An important achievement was the formulation of a national radioactive waste management policy and the elaboration of relevant strategy by the local authorities. Although not formally approved, both documents are being implemented and relevant responsibilities have been clearly allocated.

Upgrading radiation protection infrastructure

153. Assistance in radiation protection and radiation safety continues to be provided to Member States under the five thematic areas: strengthening regulatory infrastructure (TSA 1); occupational exposure control (TSA 2); medical exposure control (TSA 3); protection of the public and the environment from radiation practices (TSA 4); and nuclear and radiological emergencies (TSA 5); as well as through supporting education and training needs in radiation protection at the postgraduate level.

C.4. Europe

C.4.1. Europe region at a glance

154. In 2008, the TC programme provided support to 32 Member States in Europe. Net new obligations reached \$23.5 million, and the financial implementation rate was 85.8%. The distribution of disbursements in the region for 2008 by area of activity is shown in Fig. 7.

155. Throughout 2008, activities in the Europe region focused on the key sectors of health, energy, safety and the environment.

Special emphasis was placed on improving the quality of health care services, particularly in relation to cancer management; operation of existing nuclear power plants and planning and development of new power plants; enhancing the safety of nuclear installations and nuclear security; radioactive waste management; and protecting the environment. Other key areas included improving crop and livestock productivity and preservation of nuclear knowledge.

- Target for voluntary contributions to the TCF from countries in the Europe region **\$32.9 million**
- Disbursements for the TC programme in Europe **\$30.1 million**
- Net new obligations in Europe for 2008 **\$23.5 million**
- Implementation rate for the programme **85.8%**
- Number of countries receiving support **32**
- Expertise was provided and exchanged through **1118** expert and lecturer assignments, and between **1762** meeting participants
- Training was provided to **624** participants in training courses and **383** fellows and scientific visitors

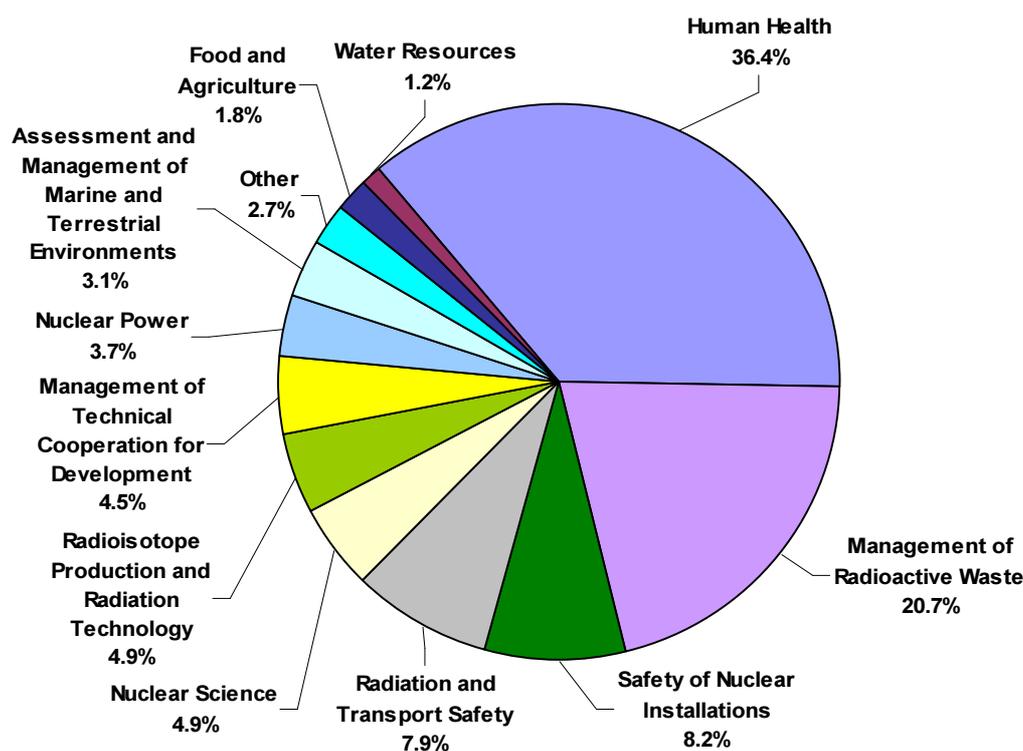


Figure 7: Disbursements by Agency Programme for 2008 – Europe

C.4.2. Managing nuclear knowledge

156. The Agency continued to support Member States in strengthening capabilities for managing, preserving and transferring nuclear knowledge and developing new skills and competences in nuclear-related areas throughout 2008 under regional project RER/0/027, ‘Strengthening Capabilities for Nuclear Knowledge Preservation’. Several initiatives took place to develop common approaches in the region to nuclear knowledge management and nuclear education. In May 2008, a meeting on the topic ‘Nuclear Knowledge Management (NKM) – Cooperation for Development’ was held in Vienna to discuss a framework for international cooperation and assistance in nuclear knowledge management. A regional workshop on ‘Knowledge Management for Nuclear R&D Organizations’ was also held May 2008 in Karlsruhe, Germany, focusing on strategy and methodology as well as on practical guidelines on starting NKM implementation. A further regional workshop, ‘Making Knowledge Work – Nuclear English for University Teachers’ was held in Kaunas, Lithuania, in June 2008, providing a forum for university teachers working in the nuclear domain to exchange good

practices and acquire new techniques in teaching nuclear sciences in English.

157. The first regional training course on ‘Innovation, Technology Transfer and Successful Technology Licensing in Research and Development Institutes’ was organized in Vienna in 2008 under project RER/0/023, ‘Strategic Planning for Management, Self-reliance, and Sustainability of National Nuclear Institutions’. The course, the first Agency event organized in partnership with the World Intellectual Property Organization (WIPO), demonstrated that the potential benefit of intellectual property protection and commercialization is still largely unexplored in nuclear R&D institutions in Central and Eastern Europe. The course was an important first step to fill this gap.

C.4.3. Human health

Improving the quality of health care services

158. In 2008, Quality Assurance Team for Radiation Oncology missions, which focus on providing comprehensive audits to radiotherapy centres to improve their practices, were fielded in Albania, Montenegro, and Poland under regional project RER/6/013, ‘Quality Assurance Team in Radiation Oncology (QUATRO): Improving the

Quality of Radiotherapy Services’, and to Poland under POL/6/008, ‘Establishment of a National Quality Assurance Programme in Radiotherapy’. A follow-up mission to a previously audited radiotherapy centre in the Czech Republic took place to review the implementation of the recommendations provided by the expert team. Due to QUATRO missions, the quality and safety of radiotherapy services were improved in the region.

safety and the overall performance of the department.

160. Another new tool, ‘Quality Assurance Audit for Diagnostic Radiology Improvement and Learning (QUAADRIL)’ evaluates the quality of all elements in the practices and overall performance of a diagnostic radiology institution, as well as its interaction with external



A QUATRO medical physics expert explains the details of clinical radiation beam dosimetry

159. New tools and assessment methodology for IAEA-developed QA/QC clinical audits in radiation medicine and diagnostic radiology were also introduced in the Europe region in 2008. A tool, ‘Quality Management Audit in Nuclear Medicine Practices (QUANUM)’ was piloted in a nuclear medicine department in Slovenia in 2008 under project RER/6/014, ‘Improving Clinical Practice in Nuclear Medicine’. QUANUM audits in nuclear medicine departments enable nuclear medicine facilities to assess the level of patient care they provide, offering an evaluation process through which the nuclear medicine department (and afterwards an external audit team) reviews and evaluates quality in all elements, including staff, equipment and procedures, patient protection and

service providers. Gaps in technology, human resources and procedures are identified so that the institution can plan for improvement. A first pilot QUAADRIL mission in Europe was conducted in a radiology department in Bosnia and Herzegovina in 2008 under the scope of BOH/6/009, ‘Strengthening Medical Physics Capacity in Diagnostic Radiology’.

161. In Estonia, Agency support to the improvement of radiotherapy services continued in 2008. With major government cost-sharing, the Agency provided a new linear accelerator to the Cancer Centre of the North Estonia Regional Hospital. With the equipment and training, the Radiotherapy Department can now perform therapeutic procedures on two almost identical machines, thereby reducing the risks involved in temporary shutdowns or service maintenance.

Estonia's University Hospital of Tartu also benefitted from equipment provision and staff training.

C.4.4. Agricultural productivity and food security

Improving crop and livestock production

162. In 2008, under regional project RER/5/013, 'Evaluation of Natural and Mutant Genetic Diversity in Cereals Using Nuclear and Molecular Techniques', group training, scientific visits and symposium participation were used to upgrade the knowledge level of participating Member States. A network of counterparts in participating countries was enhanced.

163. Under TC project UZB/5/004, 'Development of Mutant Cotton Breeding Lines Tolerant to Diseases, Drought and Salinity', Uzbekistan receives assistance in using radiation mutation to develop new cotton varieties resistant to abiotic stress factors, drought and soil salinity. In 2008, the Agency provided the Uzbek Research Institute for Cotton Breeding and Seed Production with fully automatic fibre testing equipment to measure the properties of cotton, used to select improved cotton lines.

164. Soil erosion and land degradation represent a major threat to sustainable development of agricultural production and protection of the mountainous environment in Tajikistan. Project TAD/5/002, 'Assessment of Soil Erosion and Sedimentation for Land Use' is aimed to develop capability in soil erosion studies at the Soil Science Institute located in Dushanbe and to promote soil and water conservation techniques. Activities of the IAEA were integrated into a multimillion dollar UN-led project on sustainable land management in the High Pamir and Pamir-Alai Mountains (PALM) funded by the Global Environment Facility (GEF).

165. Capacities in Tajikistan for early diagnosis of brucellosis in cattle, sheep and goats were built through TAD/5/003, 'Diagnosis and Control of Brucellosis in Cattle, Sheep and Goats', with the establishment of a laboratory for molecular and serological diagnosis, equipment and reagent supply and training in technologies, laboratory management and quality control.

These capacities can now be used to establish baseline data on the distribution of brucellosis in cattle, sheep and goats in Tajikistan, which can be translated into national epidemiological control programmes. The achievement was commended by the country's President.

166. In Turkey, TUR/5/024, 'Improving Crop Productivity through Nuclear and Related Techniques', supported improved efficiencies in drip irrigation fertigation, in terms of soil, water, and nutrients management during the growing season. The switch from traditional sprinkler irrigation to drip irrigation-fertigation generated positive results, reducing water consumption and fertilizer use. Drip-irrigation fertigation has increased from 500 to 4000 hectares in just three years in the Niğde-Nevshir region.

C.4.5. Water resource management

167. Under GEO/8/003, 'Using Isotope Techniques to Assess Water Resources', the Georgian Institute of Geophysics and the Ministry of Environment was helped to analyse the quality of water resources of the Borjomi-Bakuriani area, using isotope hydrology techniques. The region, famous for high quality water has recently been exposed to a risk of pollution. The project aims to address the problem of pollution and to ensure people's access to high quality water.

C.4.6. Environmental protection

Remediating former uranium mining sites

168. Through national and regional TC projects, international standards in monitoring and surveillance of the uranium mining and milling residues in Central Asia to establish control and prepare for remediation were introduced in 2008. Under regional project RER/9/086, 'Safe Management of Residues from Former Mining and Milling Activities in Central Asia', data on the situation and remediation prospects in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan were compiled, which can be used to support the mobilization of funds for remediation. In Kyrgyzstan, an analytical laboratory was set up at the National Academy of Sciences that can measure environmental samples from the affected areas and the Health

Ministry's radon monitoring capacity was enhanced. In Northern Tajikistan, reinforcement of an observation network for monitoring radionuclide migration patterns in the groundwater continues at Degmai, the biggest tailings site in Central Asia.

C.4.7. Sustainable energy development

169. Member States who had indicated that they were considering the introduction of nuclear power into their energy mix were supported in 2008 through regional project RER/0/026, 'Supporting the Introduction of Nuclear Energy (Phase II)'. The assistance focused on providing information contained in the IAEA publications 'Considerations for Launching a Nuclear Power Programme' and 'Milestones in the Development of a National Infrastructure for Nuclear Power'. A regional workshop on communication and public awareness introduced the topic of risk communication and showed the importance of understanding popular feeling about nuclear power in designing and executing risk communication.

170. Under project RER/0/026, 'Support for the Introduction of Nuclear Energy', assistance with energy planning was provided to Poland and Albania. Assistance was also provided to Belarus under BYE/0/005, 'Electricity Generation System Analysis for Integration of Nuclear Power in Energy System', in the development of human resources necessary for the introduction of nuclear power.

Enhancing nuclear power performance and extending service life of nuclear power plants

171. TC support to Member State fuel and material licensing needs was provided through RER/9/076, 'Strengthening Safety and Reliability of Nuclear Fuel and Materials in Nuclear Power Plants'. Member States benefited from assistance in nuclear fuel management and licensing, crude deposition on WWER fuels and WWER-440 local power peaking induced by control rods.

172. A power plant life management (PLiM) programme is essential to achieve the goal of long term safe, economic and reliable operation.

In 2008, support to activities aimed to extend the operation of nuclear power plants beyond the timeframe originally anticipated (e.g. 30 or 40 years) was provided under regional project RER/4/027, 'Strengthening Capabilities for Nuclear Power Plant Performance and Service Life Including Engineering Aspects'. The project provided engineering solutions and guidelines for the safe and reliable operation of NPPs during the design lifetime and better preparedness for possible extended lifetime. The need for engineering support in operation, maintenance and life management for long term operation is becoming increasingly evident in the implementation and decision making processes of large-scale engineering programmes, such as life extension, power uprating, outage optimization, instrumentation and control (I&C) modernization and replacement of large systems and components.

C.4.8. Industrial applications

173. New irradiation facilities were established in Bulgaria, Estonia, Kazakhstan and Portugal under project RER/8/010, 'Quality Control Methods and Procedures for Radiation Technology', which also contributed to the dissemination of advanced technologies and techniques in irradiation and sterilization facilities among participating Member States. Counterparts received accreditation and quality management systems were integrated in compliance with ISO standards.

174. A new regional project RER/8/011, 'Standard Feasibility Study for Electron Beam Flue Gas Treatment Technology', started in 2007, aiming to promote and disseminate advanced technology for flue gas emission control and to develop a standard feasibility study for coal fired boilers of the size most commonly used in Central and Eastern Europe. The industrial plant in Poland and pilot plant in Bulgaria, established in the framework of earlier TC projects (POL/8/014, 'Industrial Scale Demonstration Plant for Electron Beam Purification of Flue Gas', and BUL/8/014, 'Electron Beam Technology for Purification of Flue Gases') are being used by Member States for testing and training purposes.

175. As Mediterranean countries have a rich cultural patrimony with objects belonging to different periods and cultures, and since nuclear techniques can play an important role in their study, restoration and conservation, a regional project RER/1/006, 'Nuclear Techniques for the Protection of Cultural Heritage Artefacts in the Mediterranean Region', is being implemented. In 2008, two regional training courses, one national and one regional workshop were held, and cooperation was established between the nuclear institutions, museums and conservators in the 13 participating Member States.

C.4.9. Safety and security

Enhancing nuclear security

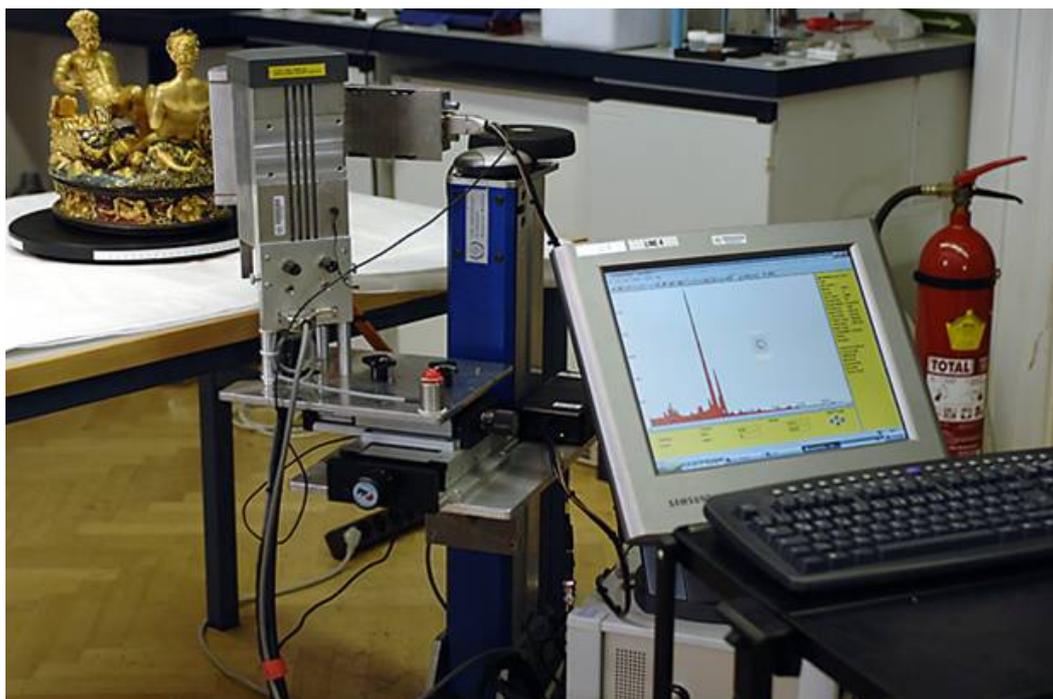
176. Some 450 Member State personnel were trained in 2008 under regional project RER/9/085, 'Awareness Creation and Training for Nuclear Security'. One national and 17 regional training events were held and the level of awareness of nuclear security was raised considerably.

Enhancing the safety of nuclear installations

177. Under the framework of RER/9/084, 'Effectiveness of Regulatory Authorities and Advanced Training in Nuclear Safety', Member

States in the Europe region were provided with assistance on regulatory oversight of licensees' safety management and human factor programmes for nuclear power plants (NPPs), the licensing process throughout the life cycle of nuclear installations and on regulatory approaches to ageing management and lifetime extension of NPPs.

178. Also at the regional level, under RER/9/087, 'Harmonization of Probabilistic Safety Assessment Applications', assistance was provided on the enhancement and maintenance of high levels of nuclear safety through the application of probabilistic safety assessments. Support was provided on reliability databases for WWERs and on the application of PSA for improving the operational safety of NPPs. Under RER/9/088, 'Strengthening Safety Assessment Capabilities', assistance was provided on safety analysis in support of NPP modifications, the application of deterministic best estimate plus uncertainty safety analysis, the application of computational fluid dynamics codes, operational events, transients and precursor analyses and quantification of safety margins.



The IAEA has developed a mobile XRF spectrometer, which can easily be carried into museums or archives for in situ measurements

179. At the national level, support was provided to Bulgaria under BUL/4/013, 'Strengthening the National Nuclear Power Infrastructure'. A two week safety mission reviewed implementation of the modernization programme of Units 5 and 6 of Kozloduy NPP and acknowledged the impressive and successful effort that was carried out by the KNPP management and staff to complete the modernization programme. Latvia is fully financing project LAT/9/007, 'Support for Radiation Protection, Waste Management, and Regulatory Activities', which aims to improve the country's regulatory, waste management and radiation protection infrastructure. In Cyprus, the Agency is supporting the regulatory role of the Department for Labour Inspection and accompanied technical support laboratories by training the staff and supplying missing equipment for comprehensive radiation protection monitoring. In 2008, both alpha and in-situ gamma spectrometers were acquired with the assistance of the Agency.

Upgrading control of radioactive sources

180. In 2008, 28 Member States participated in regional project RER/9/092, 'Strengthening National Infrastructures for the Control of Radiation Sources'. The project aims to enhance comprehensive regulatory infrastructure for safety and control of radiation sources, and to establish and develop adequate and effective regulatory mechanisms for control of radiation sources. In addition to a traditional system of notification, authorization, inspection and enforcement, some specific activities addressed relevant elements of the Code of Conduct. In 2008, one of the main events under the project was a technical meeting on 'Self-Assessment of National Regulatory Infrastructure for Nuclear and Radiation Safety', attended by 75 participants. The U.S Nuclear Regulatory Commission contributed US\$100,000 to support the project activities in 2008.

Radioactive waste management and decommissioning

181. Under regional project RER/3/005, 'Support in Planning the Decommissioning of Nuclear Power Plants and Research Reactors', support focused on the preparation of decommissioning plans for NPPs and research

reactors and on running an extensive training programme to transfer knowledge and experience from countries with advanced nuclear programmes through the IAEA International Decommissioning Network. Training for radioactive waste disposal was performed through the IAEA Network of Centres of Excellence for Training in and Demonstrations of Waste Disposal Technologies in Underground Research Facilities under INT/9/173, 'Training in Radioactive Waste Disposal Technologies in Underground Research Facilities'. Special attention was paid to deep geological disposal of high-level and long-lived radioactive waste and spent fuel.

182. Another regional project, RER/3/002, 'Quality Management of Radioactive Waste in Central and Eastern Europe', supported the management of institutional waste, covering retrieval and processing of legacy waste, waste characterization and conditioning, as well as assistance in the operation of centralized waste processing and storage facilities. The project also supported the exchange of experience on waste management practice, standard methodologies for waste management assessments, economics of waste management and QA principals for pre-disposal activities. In addition, regional project RER/9/094, 'Upgrading National Capabilities in Controlling Public Exposure', provided support for licensing (siting, design, operation, shut down and decommissioning) of centralised storage facilities for radioactive waste. The project also supported the exchange of experience on safety assessment driven corrective actions at near surface repositories.

183. In Montenegro, TC project MNE/3/002, 'Strengthening Radioactive Waste Management', saw the establishment and equipping of the first storage for low and medium level waste, while in Georgia the decommissioning of the IRT-M Research Reactor was completed under GEO/3/002, 'Decommissioning of the IRT-M Research Reactor'. In Latvia, activities to upgrade the biological shield cutting system in preparation for the decommissioning of the Salaspils Research Reactor were completed under LAT/3/002, 'Upgrade of the Biological Shield Cutting System'.

Fuel repatriation and core conversion

184. A model 'Transit Agreement' was concluded under RER/4/028, which can be used by Member States seeking to transport spent nuclear fuel across multiple countries en route to the country of origin. It was initially intended for use by Hungary, Romania, Serbia and Ukraine; however, alternative routing has been initiated for most of those shipments. The model agreement remains valid for use by other Member States in the future.

185. Fresh and spent nuclear fuel were repatriated in 2008 from the Portuguese Research Reactor under POR/4/016, 'Core Conversion of the Portuguese Research Reactor to Low-enriched Uranium Fuel'. Although fuel is normally repatriated under regional project RER/4/028, 'Repatriation, Management and Disposition of Fresh and/or Spent Nuclear Fuel from Research Reactors', the Portuguese fuel was repatriated to the USA following successful completion of core conversion from HEU to LEU fuel under a national project; and thus repatriation was continued under the same national project.

186. The transport of spent nuclear fuel from Hungary to Russia by sea (via Slovenia) in 2008 was among the most significant successes for the Russian Research Reactor Fuel Return (RRRFR) programme. This was the first such sea shipment to Russia under the RRRFR programme. Although the shipment was accomplished as a tripartite effort among Hungary, Russian Federation and USA, it paves the way for repatriation of spent fuel from Serbia in 2010 under regional TC project RER/3/006, 'Supporting the Repatriation, Management and Disposal of Fresh and/or Spent Nuclear Fuel from Research Reactors'.

Enhancing emergency preparedness and response

187. Under the framework of regional project RER/9/091, 'Establishment of National Capabilities for Response to a Radiological and Nuclear Emergency', some 50 experts were trained in national and regional training courses on the establishment of national capabilities consistent with international requirements (GS-

R-2), systems of notification and response to a radiation emergency. The participating countries included Armenia, Azerbaijan, Georgia, Kyrgyzstan, Lithuania, Republic of Moldova, Russia, Tajikistan, Ukraine, and Uzbekistan.

188. In 2008, Emergency Preparedness Review (EPREV) peer appraisal missions were conducted in Kyrgyzstan and Uzbekistan. These missions provided an independent assessment of the Member State's emergency preparedness and response programme and capabilities against international standards. Detailed recommendations on strengthening national arrangements and capabilities in response to radiation emergencies were developed as a result of the appraisals. In addition, four missions were conducted to assist in the preparation and to observe national emergency exercises, to advise on further upgrading of the national emergency notification system and to provide training on the application of the notification procedures and information exchange in case of a radiation emergency.

C.5. Latin America and the Caribbean

C.5.1. Latin America region at a glance

189. In 2008, the TC programme provided support to 22 Member States in Latin America. Net new obligations reached \$14.7 million, and the financial implementation rate was 67.6%. The distribution of disbursements in the region for 2008 by area of activity is shown in Fig. 8.

190. A regional meeting of NLOs was held in Varadero, Cuba, in September 2008, and the

regional programme and technical cooperation strategies for the region were presented. Representatives from UNDP and French and Spanish bilateral cooperation agencies also participated in the event. One purpose of the meeting was to strengthen NLO management capabilities and the capacity of the NLO office to better deliver the country programme. A programme for NLO Management Development is being prepared to help realize this objective.

- Target for voluntary contributions to the TCF from countries in the Latin America region **\$3.3 million**
- Disbursements for the TC programme in Latin America **\$16.7 million**
- Net new obligations in Latin America for 2008 **\$14.7 million**
- Implementation rate for the programme **67.6%**
- Number of countries receiving support **22**
- Expertise was provided and exchanged through **675** expert and lecturer assignments, and between **803** meeting participants
- Training was provided to **705** participants in training courses and **296** fellows and scientific visitors

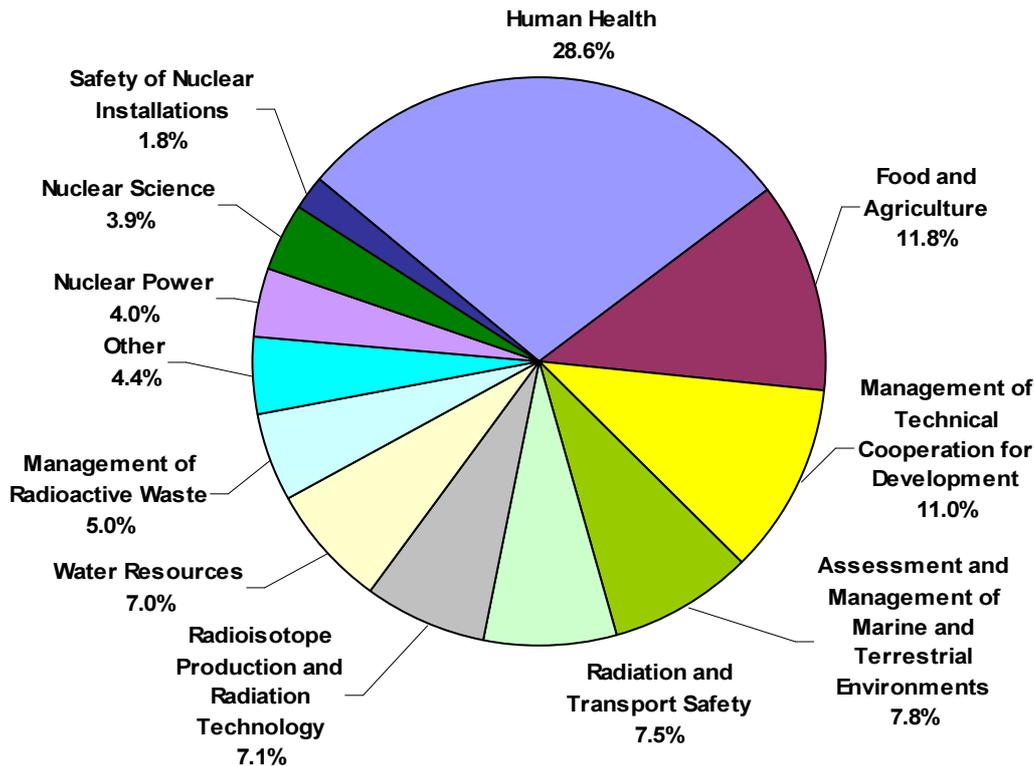


Figure 8: Disbursements by Agency Programme for 2008 – Latin America

C.5.2. Human health

Contributing to the improvement of human health status in the region

191. Telemedicine networks are being established under RLA/6/048, ‘Development of a Regional Telemedicine Network (ARCAL LXXIII)’. This project brought improved access to medical care for patients living in remote areas and optimized medical resources for the application of routine clinical practices such as tomography. The new telemedicine network provides for common acquisition and operational protocols, as well as safety standards and procedures to assure confidentiality, data integrity and control of access. Technical and medical personnel use the telemedicine facilities for clinical studies and practices, interpretation of results, personnel training and equipment maintenance. This project has allowed patients in remote sites to benefit from specialist opinions, reducing repeated tests and consequently, unnecessary doses of radiation to patients.

192. Activities under the regional project RLA/6/054, ‘Early Diagnosis of Helicobacter

Pylori Infection through the Use of Nuclear Techniques, Phase II (ARCAL LIV)’ also concluded in 2008. Helicobacter pylori (Hp) infection, a common cause of digestive problems including stomach ulcers, affects almost half the world population, causing inflammation of the stomach lining and contributing to stomach cancers and other digestive system cancers. The project helped determine the incidence of Hp infection in different regions of Latin America, improved understanding of the socio-economic factors associated with the disease and helped determine the most effective therapy to be used along with recommended complementary therapies (use of pro-biotic foods) and possible preventive therapies. Human resources in the region were strengthened in the application of nuclear techniques for the detection of Hp. Data on population affected, intervention of epidemic and pathology of Hp infection were gathered and the findings were published together with a manual in English and Spanish of guidelines and protocols on how to use the urea breath test with carbon-13 or carbon-14 to detect Hp.

193. Malaria control continues to be a major health challenge for the Latin America region. Activities under RLA/6/055, 'Use of Molecular and Radioisotope Techniques to Strengthen the Malaria Surveillance and Control Programmes', were completed in 2008. The project sought to implement health policies that prioritize the early care of patients, by increasing laboratory diagnostic capacity and the capacity for early and effective treatment of patients in the areas of transmission. As detection and early medical care for patients is essential in controlling malaria, participating countries have been able to optimize diagnosis and substantially improve the peripheral network of laboratories in order to detect patients with low parasitaemia who are not identified using the traditional method, detect asymptomatic carriers, and detect resistance to antimalarial drugs. Improvements were made in national infrastructure and services to reduce morbidity and prevent mortality caused by malaria. Effective detection and control methodologies for insect-transmitted diseases at an early stage were established and treatment using molecular biology and isotopic tracers techniques was established.

194. Two projects to improve nutritional status were completed in 2008, strengthening technical capabilities and institutional capacities. RLA/6/052, 'Evaluation of Intervention Programmes for the Reduction of Childhood Malnutrition (ARCAL LXXXIV)', assessed and enhanced intervention programmes related to overweight or obese children from Latin American populations and evaluated their impact, using isotopic techniques. Participating countries made progress in evaluating their intervention programmes and all participating countries initiated the collection of baseline data. Standard Operational Procedures on validation methods using isotopic techniques were also developed. The second nutrition project, RLA/6/053, 'Prevention and Control of Iron Deficiency Anaemia (ARCAL LXXXV)', addressed the problem of iron deficiency and ferropeenic anaemia in pregnant women, breastfed and pre-school children. It succeeded in presenting scientific evidence on the impact of national intervention programmes and strengthened technical capacity and institutional

infrastructure. Guidance was developed on the best means of preventing iron deficiency in pregnant women, non-weaned infants and pre-school children and on implementing updated anaemia prevention and control programmes.

C.5.3. Agricultural productivity and food security

195. In Latin America, TC regional and national projects related to this thematic area focus on activities to increase quality and expand production and export capacity, resulting in more rural jobs and a cleaner environment.

196. A network of laboratories was established under RLA/5/050, 'Strengthening Laboratory Capacity to Assess the Implementation of Good Agricultural Practices (GAP) in the Production of Fruit and Vegetables in Latin America'. Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador and Uruguay are now applying analytical quality systems and harmonized protocols to monitor high impact rating pesticides as indicators of GAP. The laboratories are also implementing radiotracer techniques in residue analysis and improving sampling procedures to support the different sectors. The capabilities of the network were enhanced in several areas including analytical methods, radioisotope techniques, mass spectrometry and in feeding back laboratory results to GAP stakeholders.

197. In Ecuador, the achievements of ECU/5/024, 'Improving Productivity of the African Palm through Better Fertilization and Water Management Practices', were disseminated to oil palm producers through communication groups of the National Association of Oil Palm Growers (ANCUPA). This had a high impact on crop production.

198. In Brazil, under BRA/5/057, 'Establishment of Medfly, Fruit Fly Parasitoids and Codling Moth Rearing Facility', the sterile insect technique, together with other fruit fly control techniques, have achieved suppression of the Mediterranean fruit fly population and other fruit fly pests in the Sao Francisco Valley, which produces 90% of the mango exported by Brazil. This has led to a reduction in crop losses and the

use of chemical insecticides, as well as an improvement in the quality of fruit production. Following six years of IAEA technical cooperation under RLA/5/045, 'Preparation for Pilot Fruit Fly-Free Area Using the Sterile Insect Technique', and two under PAN/5/016, 'Capacity Building for Suppression of Fruit Flies of the Genus *Anastrepha* from the Azuero Peninsula using an Area-Wide Pest Management Approach', the Panamanian Ministry of Agriculture declared the peninsula of Azuero and the southern part of Veraguas province as a Mediterranean fruit fly-free region in March 2008, allowing the region to export fresh tomatoes, peppers and papayas without any quarantine limitations. Also under RLA/5/045, Nicaragua achieved the technical conditions required for declaring the area north of Lake Xolotlan as free of the Mediterranean fruit fly and other species of fruit flies.

199. In 2008, activities under RLA/5/049, 'Integrated Control of Fascioliasis in Latin America (in Support of National Programmes)', focused on promoting the use of nuclear and nuclear-related molecular techniques for

improving diagnosis of Fascioliasis, a zoonosis disease of animals that can be transmitted to humans. This has enabled participating countries to identify areas at risk, to perform early and rapid disease diagnosis, to differentiate between the different parasites and to estimate their local distribution. A specialized network of institutes in seven Member States has been established to support the region.

C.5.4. Water resource management

200. Within national borders, TC project VEN/8/018, 'Hydro-geological Study of the Preferred Filtration Paths of Caustic Effluents', transferred technology to a national aluminium producing company, Bauxilum, to perform studies using isotope and tracer techniques to evaluate and monitor pathways and magnitudes of caustic effluents discharged into the environment. The preferential pathways of the effluents were identified and the degree of interaction between surface and groundwater was determined. A set of holes equipped with piezometers to monitor the fluxes was drilled. The counterpart now uses the techniques routinely to control the operation of the discharge pools.



Nuclear techniques are used to genetically characterize Fasciola and the different snails that act as intermediate hosts for this parasite.

C.5.5. Environmental protection

201. Capabilities for geo- and bio-indicator monitoring of marine contamination are being established in the Cienfuegos Environmental Studies Centre (CEAC) in Cuba through CUB/7/006, 'Strengthening the National Environmental Monitoring System in the Marine Ecosystem'. Baseline data enabling monitoring of the toxic contaminant levels in Cuba's main bays are now available and prognostic models have been developed to assess the environmental impact of accidental discharges of toxic contaminants in coastal ecosystems. These national capabilities also provide support to the 12 Member States in the Caribbean participating in the ongoing project RLA/7/012, 'Use of Nuclear Techniques to Address the Management Problems of Coastal Zones in the Caribbean Region'.

202. Cuba's experience has been expanded to the Caribbean Sea region. Core and surface sediment samples in Cuba, Haiti, Mexico, Nicaragua and Venezuela have been analyzed using gamma spectrometry, XRF, XRD and chromatographic techniques for radionuclides, heavy metals, trace elements and hydrocarbons for the first time, supported by the Agency and in collaboration with Spain through CIEMAT. In Nicaragua, the only capability for mercury analysis in the region has been established to support the determination of mercury pollution in the environment. A Scientific Advisory Group was set up to provide scientific advice and mentor the participating countries in the interpretation of the respective national data. Dates of sedimentation of the cores have been calculated based on lead-210 and polonium-210 data. Synergies have been established between the UNEP programme in the Caribbean and the GEF funded-REPCAR (Reducing pesticide run-off to the Caribbean) project in Colombia, Nicaragua and Costa Rica.

203. In Mexico, under MEX/1/021, 'Evaluation of Airborne Fine Particles in Mexico City', procedures were established to determine the elemental composition of air particulate matter. Air pollution emission sources were identified and the contribution of these sources to air pollution in the Mexico City area was

determined. The results are being used by the Ministry of Environment and local government environmental authorities. At the regional level, analytical data obtained by Argentina, Chile, Costa Rica, Cuba and Mexico through the ARCAL regional project RLA/7/011, 'Assessment of Atmospheric Pollution by Particles', contributed to national databases on air pollution that will support monitoring efforts. The participating countries improved their knowledge in the implementation of procedures and techniques related to characterization of airborne particulate matter.

204. Facilities at the Rural Physical Planning Division of the Ministry of Agriculture and Mining Jamaica were improved through JAM/5/009, 'Developing Soil Fertility Management'. Maps and reports have been produced indicating the distribution and concentration of major soil nutrients and heavy metals in the study area. Some of the essential micro-elements were found to be hazardous.

C.5.6. Industrial applications

205. TC project CHI/1/018, 'Development of a Confirmation Method using the Neutron Backscattering Technique for the Detection of Landmines in Arid Soil', is being carried out in cooperation with the Chilean Army. In this ongoing project, a detector prototype is being developed in the laboratory of Comisión Chilena de Energía Nuclear (CCHEN), using the Hydrogen Density Anomaly Detection (HYDAD-D) system developed to detect small (>200 g) plastic antipersonnel landmines.

206. Three institutions in Cuba have been involved in CUB/1/010, 'Establishing a Nuclear Analytical Laboratory'. The project provided equipment, including four independent spectrometers, making alpha/beta, X ray and low and high energy gamma analysis possible. Technical staff have been trained in the application and utilization of the spectrometers, enabling the transfer of technology and know how on accurate sample preparation and analysis. National capability is now available to conduct analysis using either alpha spectroscopy, XRF techniques or gamma spectroscopy.



Thermonuclear Plasma Department, Chilean Nuclear Energy Commission (CCHEN)

207. Fourteen Member States participated in the regional project RLA/2/010, 'Preparation, Quality Control and Validation of Radiopharmaceuticals based on Monoclonal Antibodies', increasing their levels of expertise in the production and use of radiolabelled monoclonal antibodies. The project also increased the use of regional resources, which in turn increased the professional radiopharmacy levels essential for the practice of Nuclear Medicine. The completed project has strengthened relations among the participating countries and improved interrelation between technicians and professionals. The technology related to the application of biomolecules in radiopharmacy was transferred from the more experienced countries in the region and third generation radiopharmaceuticals have been incorporated into the diagnosis and therapeutic processes of nuclear medicine services in the region. The participating countries are in a better position to provide improved diagnostic services based on the use of radiolabelled monoclonal antibodies.

C.5.7. Sustainable energy development

Nuclear energy planning and production

208. The TC project RLA/4/021, 'Cracking and Structural Integrity of Components in Light Water Reactors', supports the exchange of information on optimized service life and

management practices to develop mechanisms of regional integration for improving the performance and safety of NPPs in Argentina, Brazil and Mexico. The long term structural integrity of the components of pressurized reactors is essential for the safe and reliable operation of NPPs. The Agency has accumulated experience and knowledge in the field of structural integrity, in particular in the area of the assessment of the integrity of primary circuit components for light water reactors. Several workshops have taken place to support knowledge transfer.

209. Argentina is working to maximize the availability and the capability of power plants currently in operation in order to address a projected shortfall in national electric power generation capabilities. Embalse Nuclear Power Plant (NPP) generates 600 MWe, playing an important role in the central region of the country. The NPP lifespan had been designed to terminate in 2012, but current plans aim to extended operations beyond the designed plant lifetime, as long as the relevant safety and performance requirements are met. To verify beyond design life time operation, the national project ARG/4/091, 'Plant Life Management Programme for Critical Systems, Structures and Components of Embalse NPP', has developed a plant life management program (PLiM) jointly

with international and local experts and prepared the regulatory basis for license renewal.

210. The Government of Argentina also decided recently to complete the construction and proceed with the commissioning of the Atucha II NPP. This process is taking place under the direct responsibility of the utility Nucleoelectrica Argentina Sociedad Anonima (NASA) with the collaboration of the National Atomic Energy Commission (CNEA). The TC project ARG/4/090, 'Completing the Atucha II Nuclear Power Plant', fully funded by NASA, supports the construction and commissioning of Atucha II NPP and advises the Atucha II NPP Project Director on the actions recommended for successful project finalization. In 2008 several expert missions were fielded in support of the Atucha II NPP project in a range of technical fields.

Waste management

211. In the field of Radioactive Waste Management, the assistance provided by the Agency under RLA/3/005, 'Strengthening the Radioactive Waste Management Infrastructure in Latin America and the Caribbean Countries', has been mostly focused on strengthening radioactive waste management infrastructure and developing technical capabilities. An important regional workshop was held in Peru in May 2008 to advise the country participants on the development and implementation of national strategies for sustainable, safe and cost-effective radioactive waste management. The lack of repositories for radioactive waste in Latin America and the need to develop such facilities was addressed at a regional training course in Argentina involving experts from radioactive waste management organizations responsible for the planning and development of repository projects. Another regional training course was held in Brazil with the objective of developing the facility operators' skills on quality management aspects.

C.5.8. Safety and security

212. Technical cooperation activities in Latin America have been important in upgrading the nuclear safety infrastructure of Member States

and in preparing for and responding to emergencies. Assistance continues to be provided in six thematic areas.

213. For strengthening regulatory infrastructure (TSA-1), Member States started the process to develop regional guides for licensing and inspection of the different nuclear practices. Under occupational exposure control (TSA 2), practices and workers with higher risk of exposure were identified in all countries. The exposure monitoring coverage of the workers and workplaces increased. Technical capabilities for the establishment of occupational radiation protection programmes at end-user facilities were developed. Several countries are analysing the impact of NORMs that may lead to potential occupational exposure. With regard to medical exposure control (TSA 3), a radiological protection network of interventional cardiologists, who are the most intensive users of fluoroscopy in the medical profession and who have one of the highest levels of exposure for patients and medical staff, was created.

214. In the area of protection of the public and waste safety (TSA 4), a draft document was developed that was used to review the compliance of centralized storage facilities for radioactive waste with IAEA safety standards. Recommendations were made to improve their safety features in compliance with the safety standards. For nuclear and radiological emergencies (TSA 5), progress was made with respect to the basic responsibilities associated with establishing an emergency response capability, establishing emergency management and operation and developing emergency plans. Finally, in the area of supporting education and training needs in radiation protection (TSA-6), the support given at the postgraduate level on radiation protection and nuclear safety continued.

215. Regional Training Courses were provided on Foundations of Physical Protection of Nuclear Material and Facilities and Nuclear Safety Culture, funded by the Nuclear Security Fund.

Glossary and Acronyms

adjusted programme - the total value of all technical cooperation 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.

AFRA - African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology.

ARASIA - Co-operative Agreement for Arab States in Asia for Research, Development and Training Related to Nuclear Science and Technology.

ARCAL - Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean.

assessed programme costs (APCs) - the cost charged to Member States receiving technical assistance, amounting to 8% of the assistance actually provided from both the Technical Cooperation Fund and extrabudgetary contributions (but excluding UNDP-financed assistance). This mechanism was suspended in 2004, and replaced by National Participation Costs (see document GOV/2004/46).

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:

- it is in an area where there is a national programme enjoying strong government commitment with evidence of significant financial support; or
- 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.

Country Programme Framework (CPF) - a descriptive planning process that provides a

concise frame of reference for future technical cooperation with Member States agreed in a document between the concerned State and the Agency.

disbursements - actual cash outlays for goods provided and services rendered.

due account - the mechanism by which the Agency accords preference in terms of Technical Cooperation Fund allocations and procurement to those Member States with a good record of financial support to the technical cooperation programme. The objective is to increase the level of contributions to the Technical Cooperation Fund. Previously, it was also intended to improve the record of payment of assessed programme costs.

earmarkings - amounts allotted for funding approved assistance awaiting implementation.

extrabudgetary funds - funds provided by Member States or organizations 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 Cooperation Fund.

footnote-a/ projects - projects approved by the Board for which no immediate funding is available.

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

implementation (in financial terms) - 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 from a Member State that represent savings to the Agency, such as an expert's fee, the daily subsistence allowance for a lecturer, or the travel costs for a fellow.

National Participation Costs (NPCs) - Member States receiving technical assistance are assessed a charge of 5% of their national programme, including national projects and fellows and scientific visitors funded under regional or interregional activities. At least half of the assessed amount for the programme must be paid before contractual arrangements for the projects may be made. This mechanism replaces assessed programme costs, which were suspended in 2004 (see document GOV/2004/46).

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.

NPP – nuclear power plant

overprogramming - the establishment of programming levels that exceed available resources.

PACT - Programme of Action for Cancer Therapy

programme commitments - total disbursements plus unliquidated obligations for the current year plus earmarkings.

Programme Cycle Management Framework (PCMF) - an approach to the technical cooperation programme, facilitated by an IT platform for registered users to develop and manage technical cooperation projects from project concept submission through project design, approval, implementation and evaluation. It provides all stakeholders (in Member States and the Secretariat) with access to their projects and facilitates real-time interaction between members of the project team.

programme year - the year in which a technical cooperation project is planned to start.

Programme Reserve - an amount set aside by the Board each year for financing assistance of an urgent nature requested after the Board has approved the technical cooperation programme for the year in question.

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

RCA - Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology.

Revised Supplementary Agreements - these agreements govern the provision of technical assistance by the Agency and set forth the specific conditions required under the Agency's Statute for the provision of such assistance.

rephasing - a reallocation of project 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.

SIT - Sterile Insect Technique

Technical Cooperation Fund (TCF) - the main fund for the financing of the Agency's technical cooperation activities; it is supported by pledged contributions from Member States, assessed programme cost arrears and National Participation Costs paid by Member States 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 fellowships - fellowships provided by Member States at little or no cost to the Agency.

usable unobligated balance - the unobligated balance of the Technical Cooperation Fund less the sum of pledges not yet paid and the dollar equivalent of currencies that can only be used with great difficulty. The purpose is to measure the amount of money that is readily available for technical cooperation programme obligations.

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