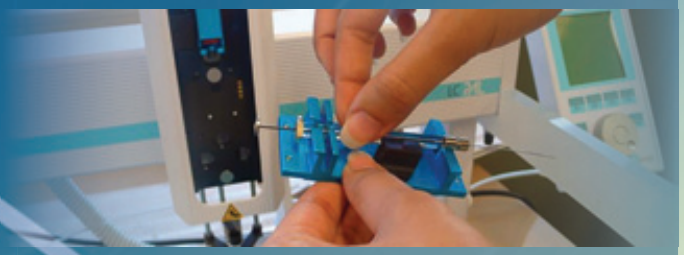
Technical Cooperation Report for 2009

Report by the Director General



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TECHNICAL COOPERATION REPORT FOR 2009

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 2009, the draft of which was considered by the Board at its June 2010 session.

The Director General is also hereby reporting in fulfilment of the request contained in resolution GC(54)/RES/12 on "Strengthening of the Agency's technical cooperation activities".

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Summary

This year's Technical Cooperation (TC) Report is set out in three parts: A, Strengthening the Agency's technical cooperation activities; B, mobilizing resources for the TC programme; and C, Programme activities and achievements in 2009, organized according to region and thematic sector.

This year, part A of the Report concentrates on a number of overarching themes: innovative approaches to the development of human resources, links to the Millennium Development Goals (MDGs), and regional cooperation and technical cooperation among developing countries. The report also provides an overview of recent Office of Internal Oversight Services (OIOS) evaluations of TC projects.

The Agency offers training to individuals and groups around the world, delivered through many channels. The Agency's traditional national and regional training courses are well known, but it also supports human resource development in a range of innovative ways, through distance learning, for example, or by offering opportunities for continuous professional development. TC projects have supported curriculum development in many Member States, and the Agency's proactive approach to educational partnerships has ensured the participation of a wide spectrum of specialised organizations and networks. Fellowships and scientific visits complete the spectrum of available training opportunities, and in this area too, the Agency has deployed new practices to address the challenge of placing fellows in today's security-conscious world. By utilising fellowship placement and management institutions in host countries, and by hosting special courses for national groups in Vienna, the Agency ensures that urgent national needs are addressed even in difficult circumstances.

In September 2011, the UN will hold a special summit to push forward efforts to achieve the MDGs, so it is timely to examine how the technical cooperation programme contributes to their achievement. Recent inhouse studies, coupled with a closer alignment between Country Programme Frameworks, UN Development Assistance Frameworks and national development plans, have highlighted several areas where Agency competencies offer very specific support to certain goals. The many TC projects on mutation breeding, application of the sterile insect technique and improved livestock breeding offer targeted support to poverty reduction under MDG 1, while projects on childhood nutrition contribute to MDG 4, reduction of child mortality. Other areas where the Agency provides important input are MDG 5, improvement of maternal health, MDG 6, combating the spread of HIV/AIDS, malaria and other diseases, MDG 7, ensuring environmental sustainability and MDG 8, development of global partnerships for development.

Regional cooperation was strengthened in 2009 with the establishment of the Forum of Nuclear Regulatory Bodies in Africa, steps to develop a regional profile for RCA, and the implementation of the plan of action for the institutional strengthening of ARCAL. The regional and cooperative agreements remain the primary mechanisms for technical cooperation among developing countries.

The implementation rate for OIOS recommendations since 2002 has reached 66.7%, attributed in part to the expansion of the Programme Cycle Management Framework (PCMF) IT platform. The OIOS carried out four TC related evaluations in 2009, on food irradiation, support to countries considering nuclear power programmes, projects on research reactors, and fighting cancer in Africa. In addition, an evaluation of Agency support to tsetse eradication in Ethiopia was completed. A number of common issues could be identified, such as limited data availability, and the assessment of real achievement of project objectives.

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. Pledges to the Technical Cooperation Fund totalled $79.9 million (not including NPC, APC and miscellaneous income), or 94.0% of the $85 million TCF target set for 2009. For the technical cooperation programme as a whole, new resources stood at $112.2 million, increasing from the 2008 total of $91.5 million. The TC programme, as a whole, disbursed a total of $85.4 million (including in-kind), and achieved an implementation rate of 77.3% ($101.0 million in new obligations).

Part C of this document responds to the operative paragraphs of resolution GC(53)/RES/12, dealing with assistance to Member States in the peaceful, secure and regulated application of atomic energy and nuclear techniques in specific fields. This part highlights activities and achievements in technical cooperation in each of the regions in 2009, describing regional emphases and responses to national priorities. Each region presents project information according to thematic sector, covering human health, agricultural productivity and food security, water resource management, environmental protection, industrial applications, sustainable energy development, nuclear safety and nuclear security.

Programme distribution in 2009 differed considerably both between regions and from the previous year. Human health accounted for 29% in Africa, 19% in Europe and Latin America and remained at 16% in Asia and Pacific. Food and agriculture shows a greater degree of differentiation, with 26% in Africa, 17% in Asia and the Pacific, 11.3% in Latin America, and just 2.8% in Europe. Nuclear safety accounted for 19% in Europe and 17% in Asia and the Pacific and Latin America in 2009, but for just 9% in Africa.

Globally, current trends point to a significant expansion in the use of nuclear power. The increased interest among Member States led to a three-fold increase in the number of technical cooperation projects related to this area in the 2009–2011 TC cycle. Fifty-eight Member States are participating in regional or national technical cooperation projects related to the introduction of nuclear power.

At the regional level, building human resource capacity remains the single most important area of activity in the TC programme in Africa, in every sector. Human health remained the top sectoral priority, with significant activity in support of cancer treatment and radiotherapy facilities in Algeria, Burkina Faso, Senegal and Uganda. Projects to support screening for thalassemia in Egypt and sickle-cell disease in Gabon were also carried out.

In Asia and the Pacific, the surge in interest in nuclear power noted in 2008 continued, although this is not directly reflected in the percentage of programme disbursement. Top areas for disbursement in the region were split fairly evenly between human health, food and agriculture, nuclear safety, and radioisotope production and radiation technology. A soil erosion project at the regional level has helped participating Member States to evaluate soil conservation measures, and in Mongolia, isotope techniques are helping to establish soil fertility rates.

In Europe, support to nuclear medicine services in Kazakhstan and Tajikistan is contributing positively to national healthcare systems, and reducing the need to seek nuclear medicine services abroad. Throughout Europe, Member States are being helped to reinforce nuclear and radiation safety infrastructure in accordance with IAEA safety standards.

In Latin America, an upswing in activity related to the food and agriculture sector reflects how the food security crisis continues to affect the region. The sterile insect technique is being widely applied in support of the fruit and horticultural sectors, resulting in the eradication of a cactus moth outbreak in Mexico, and the expansion of Belize’s citrus export industry following suppression of the Mexican fruit fly. Childhood obesity in Latin America has reached epidemic proportions, and a five year regional project has raised public awareness of the importance of appropriate nutrition and established baseline data for intervention programmes.

Safety and security issues remain strongly on the agenda in all regions, noticeably so in Europe where Member States are dealing with an increase in demand for nuclear power, while at the same time managing ageing power plants. In Africa, support is focused on the development of regulatory infrastructure and on legislative assistance, while in Asia and the Pacific, the Agency is promoting a comprehensive national legal framework and helping to establish the necessary legal and regulatory infrastructure. The upgrade of radiation protection infrastructure is also an important issue. In Latin America, the harmonization of national emergency preparedness systems at the regional level has been supported through two regional events and a number of national training courses, and other projects are being implemented to improve the operational national regulatory infrastructure for the control of radiation sources.

Regarding security issues, regional projects to develop human resources in nuclear security have continued throughout 2009, concentrating on training, fellowships and the implementation of international legal instruments. Projects are targeted to law enforcement agencies such as police, customs and civil protection, and to radiation safety regulatory authorities in every Member State.

The Agency's Technical Cooperation Programme at a Glance (as at 31 December 2009)

The target for voluntary contributions to the Technical Cooperation Fund for 2009 was **$85 million**.

The rate of attainment stood at **94.0%** on pledges and at **91.1%** on payments at the end of 2009.

New resources for the technical cooperation (TC) programme were **$112.2 million**.

- Technical Cooperation Fund (including TCF payments for previous years, NPC, APC, miscellaneous income): **$86.1 million**
- Extrabudgetary resources: **$24.6 million**[1] (including $0.2 million from UNDP)
- In-kind contributions: **$1.5 million**

The adjusted budget for the TC programme for 2009 was **$130.7 million**.

Disbursements for the TC programme (including in-kind) reached **$85.4 million**.

Net new obligations during the year were **$101.0 million**.

The implementation rate for the programme was **77.3%**.

The implementation rate for the TC-approved core programme was **80.2%**

The number of countries/territories receiving support from the programme was **125**.

Revised Supplementary Agreements are in force in **110** Member States.

19 Country Programme Frameworks were signed by Member States and the Agency in 2009. **65** CPFs are current.

[1] Please refer to Table A.5 of the Supplement to this Report for details. This table does not include the $ 0.2 million from UNDP (for expenditures already incurred)

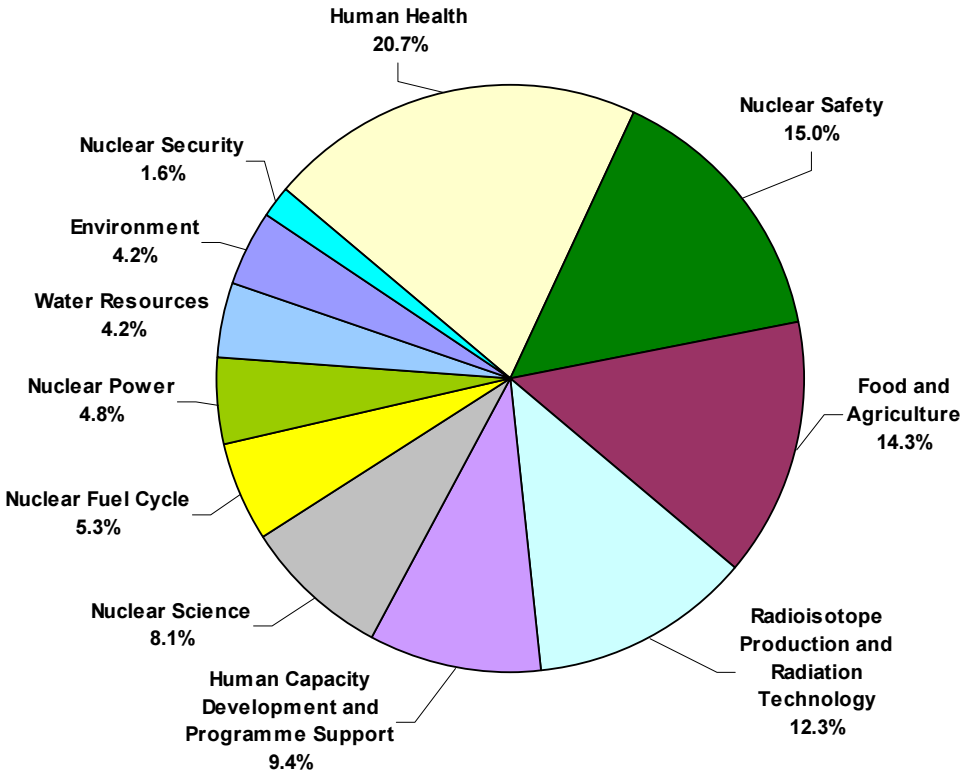

Figure 1: Disbursements by Technical Field for 2009 (Nuclear safety includes transport safety and safe management of radioactive waste, nuclear fuel cycle includes predisposal and disposal of nuclear fuel waste)[2].

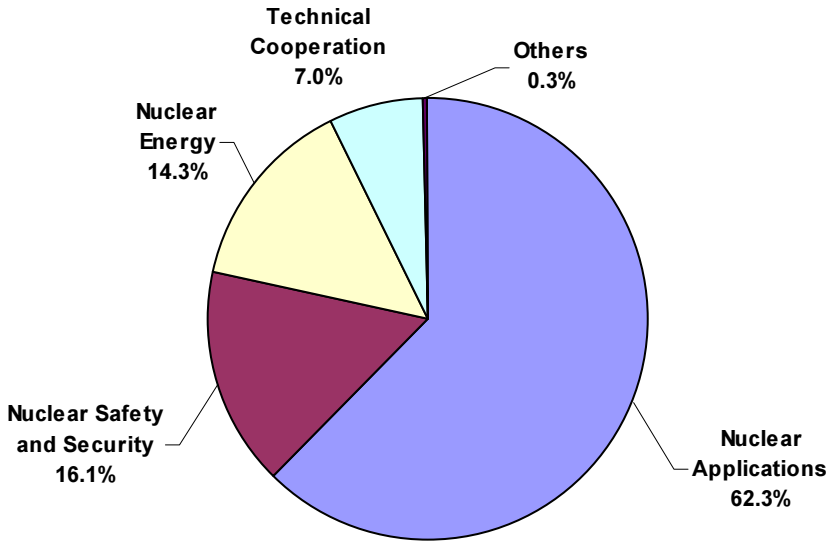

Figure 2: Technical Department support for TCP implementation according to primary technical officer[3].

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

[3] TC projects may have more than one technical officer from more than one technical Department. This chart indicates the technical Department with the leading technical role in each specific TC project. It does not indicate Major Programme budgetary support to the TC programme.

Technical Cooperation Report for 2009

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(53)/RES/12.

2. Part A of the document provides an overview of technical cooperation activities from 1 April 2009 to 31 March 2010. It concentrates on innovative approaches to the development of human resources for the peaceful application of nuclear technology, focusing on distance learning, educational partnerships and curriculum development. It also examines Agency contributions to the achievement of the Millennium Development Goals, and presents some findings from evaluations of TC activities carried out in 2009 by the Office of Internal Oversight Services. Lastly, it reviews regional cooperation and technical cooperation among developing countries over the past year.

3. Part B presents a summary of financial indicators, reviewing mobilisation 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(53)/RES/12, 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 and regional projects and achievements.

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A. Strengthening the Agency's technical cooperation activities[4]

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: a range of responsibilities, activities and initiatives are undertaken by the Member States, together with management and coordination activities on the part of the Department of Technical Cooperation and expert scientific and technological support by the technical Departments.

6. Member State financial support to the TC programme in 2009 continued at its customary high level, reflected in a 94% rate of attainment, and also in the degree of in-kind support provided. Extrabudgetary support from donors and international and bilateral organizations reached $18.4 million, considerably higher than the 2008 figure of $6.3 million. Governments also provided over $5.9 million in support to the TC programme in 2009 through the cost-sharing mechanism.[5]

7. 2009 was the first year of the 2009–2011 TC programme cycle, and 453 new national projects, 124 new regional projects and 6 new interregional projects were initiated. At the same time, 351 projects were closed (including 9 cancellations). Active projects now total 1082, with an additional 256 currently in closure.

A.1.2. Developing human resources for the application of nuclear technology

8. Human resource development is one of the two primary vehicles through which support is provided to Member States, the other being the provision of equipment. The lack of skilled staff and well trained human resources is a significant constraint in many Member States, in particular in the Africa region. Potential candidates for training may find it difficult to find the time to travel abroad for extended periods, while at the same time, a lack of educational prospects at the national level may lead to talent flight, as scientists and medical personnel leave their home country to take advantage of opportunities in other countries.

9. Human resource development through traditional Agency programmes is also facing challenges, particularly in relation to difficulties in placing candidates for fellowships and scientific visits. To address these challenges, the Agency is supporting training and professional advancement in a number of innovative ways, such as e-learning, courses for continuous professional development, and the relocation of specialized training courses.

10. An increasing number of fellowships, scientific visits, and training courses were offered to African Member States in 2009, addressing the need for skilled staff and well trained human resources in the region. In 2009, 557 fellowships and scientific visits were granted and 1568 scientists and technicians participated in regional training courses and technical workshops. At the regional level, the AFRA cooperative programme continues to pursue the implementation of its regional strategy for long term capacity building in nuclear sciences and technology and applications.

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[4] Section A responds to operative paragraph 16 of resolution GC(53)/RES/12 on strengthening TC activities through the development of effective programmes and well defined outcomes.

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

Distance learning

11. A programme has been developed under RAS/6/029, 'Distance-assisted Training for Nuclear Medicine Technicians (RCA)', to provide on-the-job training for nuclear medicine technologists under the supervision of nuclear medical specialists. The training material covers 23 subjects, contains more than 150 practical exercises, and is available in English, French and Spanish for use in other regions. Distance learning material has also been prepared under RAS/6/033, 'Distance Education in Radiation Oncology (RCA)', to supplement formal radiation oncology training. The Applied Sciences in Oncology (ASO) programme comprises 80 training modules that have been pilot tested in seven RCA, ARCAL and AFRA Member States. The training programme is available on CD, and can also be downloaded from the IAEA web site.

12. RAS/0/047, 'Supporting Web-Based Nuclear Education and Training through Regional Networking', addresses needs for nuclear education and training opportunities through the ANENT Cyber Platform (www.anent-iaea.org) for development in the Asia and the Pacific region. The project consists of three components: training of trainers on using the Cyber Platform as an e-learning tool, content development, and technical development and maintenance of the Cyber Platform servers.

13. In Latin America, RLA/0/040, 'Regional Project on Capacity Building for Sustainable Energy Development', was delivered using an innovative educational approach. Professionals were trained to carry out energy demand studies using the Model for Analysis of Energy Demand and to assess the optimal energy supply system to meet demand using the analytical tool Model for Energy Supply Strategy Alternatives and their General Environmental Impacts (MESSAGE). The project used OLADE's computer based platform CAPEV to deliver e-learning courses and to carry out monthly virtual review meetings. E-training material developed by the Department of Nuclear Energy's Planning and Economic Studies Section (PESS) was used in conjunction with the CAPEV tool to supply 'daily on-line support' for the courses. Through the project, country teams learned to assess energy needs and to develop alternative strategies for the energy supply system, and produced studies of their national energy systems.

Continuous professional development

14. In Europe, RER/6/015, 'Strengthening Regional Capacity in Medical Radiation Physics', ran from 2007 to 2008, providing opportunities for continuous professional development through regional training courses for medical radiation physicists in radiotherapy. Six regional training courses were co-organized with the European Society for Therapeutic Radiology and Oncology (ESTRO), attended by over 70 participants. Support was also provided to ten participants who attended a training course on medical imaging with ionising radiation organized by the European School of Medical Physics (ESMP). The project's contribution to professional development provided participants with encouragement and incentive to further develop in their field, and served to increase motivation, staff retention and professional qualifications.

Curriculum development

15. In Ghana, GHA/0/009, 'Human Resource Development and Nuclear Technology Support', provided training in high priority areas for young professionals and helped to strengthen the national nuclear infrastructure, and supported the establishment of a regular academic programme in nuclear and applied sciences.

16. RCA project RAS/6/038, 'Strengthening Medical Physics through Education and Training (RCA)', addresses the lack of clinical training programmes available to medical physicists in the developing countries of the Asia and the Pacific region. A clinical programme for radiation oncology medical physicists is being pilot tested at a number of sites. The project supports recognition of the role of the medical physicist, particularly in cancer treatment and diagnosis.

17. Under RAS/9/058, 'Supporting Education and Training in Radiation Protection', short duration post-graduate educational courses (PGEC) targeting radiation protection have been

introduced in Malaysia and Syria to meet the educational and initial training requirements of graduate level staff earmarked for positions in radiation protection. Participants are expected to become leaders and trainers in protecting the health and safety of workers and the public from the hazards caused by exposure to ionizing radiation.

Educational partnerships

18. Regional project RLA/7/014 'Designing and Implementing Systems for Early Warning and Evaluation of the Toxicity of Harmful Algal Blooms in the Caribbean Region, Applying Advanced Nuclear Techniques, Radioecotoxicological Evaluations and Bioassays (ARCAL CXVI)' is providing training in the taxonomy and monitoring of marine harmful algae to address a lack of qualified human resources in the region. The project is implemented by nuclear, environmental and academic institutions dealing with harmful algal blooms (HABs) in fourteen Member States, and is linked to the Intergovernmental Oceanographic Commission Sub-Commission for the Caribbean and Adjacent Regions/United Nations Educational, Scientific and Cultural Organization (UNESCO) programme, Regional Working Group and Network on Harmful Algae in the Caribbean, which aims to develop regional capacities to monitor HABs and to integrate groups and institutions working on the subject. The project is supported by the National Oceanic and Atmospheric Administration (NOAA-USA), the Intergovernmental Oceanographic Commission (IOC) and IOC-Vigo (Spain). In 2009, an innovative two-stage training course was carried out in partnership with IOC/UNESCO and local experts from the Marine and Limnological Science Institute, Universidad Nacional Autónoma de México. An obligatory six week e-learning module provided participants with the background for a subsequent two week practical course at a site in Mexico.

19. In 2009, fifteen water resource scientists and managers from Latin America participated in a course on Isotope Techniques for River Basin Management. Experts from the US Geological Survey (USGS) and the IAEA provided participants with lectures and hands-on training on the use of isotope data to assess river basin processes and to improve precipitation-runoff models. An innovative training/capacity building module in isotope hydrology and related fields was established as a joint collaboration between the IAEA and the Argonne National Laboratory, Illinois, USA.

Supporting fellowships, scientific networks and participation in World Nuclear University (WNU)

20. Fellowships and scientific visits are implemented, where possible, with the help of fellowship placement and management institutions located in the host country. These organizations remove a significant administrative burden from the Agency and provide valuable local knowledge. They support the programme by helping to find appropriate training institutes for the requested programme of study, and by negotiating fees. They also support fellows and scientific visitors on their arrival in the host country, and monitor the fellow's progress for study periods of over six months, among other tasks. The institutions can also help with obtaining security clearance and visas, often a bottleneck in the placement of fellows.

Fellowship placements: Examples from Australia and Germany

ANSTO coordinates and facilitates the IAEA fellowship programme in Australia, and acts as a host to some scientific visitors. In 2009, ANSTO welcomed fellows and visitors from Vietnam, Bangladesh and South Africa and coordinated 26 placements in institutions as diverse as the Queensland University of Technology, Peter MacCallum Cancer Centre, the Western Australian Department of Agriculture and the University of New England. As of February 2010, 25 IAEA placements are planned, in progress, or just completed.

In Germany, the Zentralinstitut für Elektronik (ZEL), Forschungszentrum Jülich GmbH, has been providing support in the field of Nuclear Instrumentation to the IAEA for several decades, hosting fellowships, scientific visits and providing experts for field missions and lecturers to IAEA-sponsored training courses. The courses and fellowships deal with topics such as data acquisition, microprocessors and electronics for maintenance and refurbishment of nuclear instruments. During 2009, the Institute hosted fellows from South America, Africa and Asia. After their return to their home country, the Institute stays in contact with its trainees, enabling the Institute to establish a good network with research institutions around the world. The administration of the fellowships is undertaken by Capacity Building International (Inwent), Germany.

21. To address the challenge of placing fellows, national training courses and other meetings are sometimes hosted in Vienna. This approach is proving effective in addressing urgent national needs, especially in nuclear safety and radiation protection.

22. As part of its contribution to international efforts to preserve nuclear knowledge, the Agency is a sponsor of the World Nuclear University. The Agency supported 16 participants from 15 Member States, enabling them to attend WNU's Summer Institute in London, UK, in July and August 2009.

A.1.3. Linking to the Millennium Development Goals[6]

23. The Millennium Development Goals (MDGs) were adopted by the international community as a framework for the development activities of over 190 countries worldwide. Sound progress has been made in some MDG areas, and a number of targets are expected to be reached by 2015. Technological solutions are vital for the full and successful achievement of the MDG targets. In order to maximize the contribution of nuclear science and technology to the achievement of national development priorities and in support of developing countries, the Agency works closely in partnership with other United Nations agencies, research organizations and with civil society at national and international levels. Innovative contributions from nuclear science and technology, in particular radiation medicine and isotope techniques, are successfully applied in supporting the attainment of MDG 4, reducing child mortality (through breastfeeding support programmes), MDG 5, the improvement of maternal health, MDG 6, combating the spread of HIV/AIDS, malaria and other diseases, MDG 7, ensuring environmental sustainability and MDG 8, developing global partnerships for development to address the special needs of the least developed countries, landlocked countries and small island developing states, and make available the benefits of new technologies.

24. Regarding the attainment of MDG 1, the overarching goal of reducing absolute poverty by half is within reach for the world as a whole. However, high food prices may push 100 million people deeper into poverty. People who do not produce their own food are the most severely affected because a large proportion of their expenditure is allocated to food. Improving national food security in a sustainable way through increasing crop productivity and diversification is high on the development agenda of many IAEA Member States. The

[6] Section A.1.3. responds to operative paragraph 19 of resolution GC(53)/RES/12 on the promotion of key areas identified in the Johannesburg Plan of Implementation and the attainment of the Millennium Development Goals.

Agency has helped Member States to implement modern and competitive plant breeding programmes using radiation induced mutation and efficiency enhancing bio- and molecular technologies such as in vitro techniques, molecular markers and genomics. Efforts focus on improving yield and quality by enhancing the diversification and adaptability of crops for domestic use as well as for export markets, thus contributing to income generation and socioeconomic development. So far, 3088 mutant varieties from 170 different plant species have been officially released in more than 60 countries around the world. These crop mutants not only increase biodiversity, but also provide material for conventional plant breeding, thus directly contributing to the conservation and use of plant genetic resources. Over 1000 mutant varieties of major staple crops enhance rural income, improve human nutrition and contribute to environmentally sustainable food security in the world. In 2009, the Agency contributed to improving food security worldwide with a total of 67 national, six regional, and one interregional plant breeding projects implemented through technical cooperation, scientifically and technically supported by the Joint FAO/IAEA Programme.

25. In Vietnam, VIE/5/015, 'Enhancement of Quality and Yield of Rice Mutants Using Nuclear and Related Techniques, Phase II', ended in 2009. According to the statistics from the counterpart institute, mutant rice varieties produced through this project (now continued as regional project RAS/5/045, 'Improvement of Crop Quality and Stress Tolerance for Sustainable Crop Production Using Mutation Techniques and Biotechnology (RCA)') had, over eight years, generated some $374 million in farm income by the end of 2008. One mutant rice variety, VND9S-20, has become one of the top five varieties for export rice production, and is grown on more than 300 000 ha per year in South Vietnam due to its high yields, good quality and tolerance to brown plant hopper. Since 2008, mutant rice varieties are cultivated on over 2.54 million ha in Southern Vietnam.

26. In Bangladesh, under RAS/5/045 and BGD/5/026, 'Increasing Agricultural Production in the Coastal Area through Improved Crop, Water and Soil Management', and based on ground work laid by RAS/5/037, 'Mutational Enhancement for Genetic Diversity in Rice (RCA)', the Agency supported the development of a rice mutant variety, BINA Dhan-7. This early-maturing, high-yielding variety alleviates the effects of the food insecure Monga season in Bangladesh. It also contributes to additional income for local farmers, who prefer it as the average yield rate per ha is 4.5 metric tons, colours are attractive, and rice grains are longer and finer, achieving higher market prices than other varieties. Non-governmental organizations (NGOs) and government agricultural extension workers have set up hundreds of demonstration sites and organized demonstration and dissemination activities such as field days. For example, one NGO – Rangpur-Dinaspur Rural Agriculture Service – disseminated BINA Dhan-7 seeds to 2,300 farmers in 2008 and plans to increase to 10,000 farmers in 2010. This variety may be grown in around 80% of rice areas in the coming two to three years, with high socioeconomic benefits for farmers.[7]

27. The Agency also assists Member States to improve their national food security through improved livestock productivity. Projects concentrate on efficient use of locally available feed resources, adequate management practices and breeding programmes for indigenous and upgraded animals, as well as on diagnostic tools and prophylactic measures for the control and prevention of animal and zoonotic diseases. In Honduras, HON/5/005, 'Improving the Nutrition and Health Conditions of Livestock in Order to Increase Productivity and Reproductivity (Phase II)', is an example of an integrated approach work to provide laboratory services, feed evaluation, frozen semen, and technical advice to livestock farmers and farmers associations. The Agency, through the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, is working with FAO, the World Health Organization (WHO) and the World Organisation for Animal Health (OIE) to

[7] More examples of projects to improve food security are given in Section C of this report.

reinforce the 'One Health' approach in interactions between human and animal health agencies worldwide. In 2009, the Agency contributed to improving food security worldwide with a total of 49 national and five regional animal production and health projects implemented through technical cooperation, and scientifically and technically backstopped by the Joint FAO/IAEA Programme.

A.1.4. Regional cooperation and technical cooperation among developing countries[8]

28. The Forum of Nuclear Regulatory Bodies in Africa (FNRBA) was established in March 2009. The founding of the Forum is a major step in enhancing regional cooperation and strengthening regulatory infrastructures in Africa. The Third Meeting of the Forum took place in Vienna in September 2009, in the margins of the 53rd IAEA General Conference. AFRA Member States have also established a Regional Advisory Safety Committee on Research Reactors in Africa, which provides a platform for enhanced regional cooperation and supports exchange of information and relevant experience.

29. In the Asia and the Pacific region, regional projects, including those under RCA and ARASIA, continued to be the primary mechanism for technical cooperation among developing countries (TCDC). A Working Group has been appointed to develop a regional profile for RCA that will further promote the TCDC modality and enhance regional cooperation. Also under RCA, the Agency supported several regional organizations interested in cooperative arrangements, such as the RCA Regional Office (RCARO) and the Forum for Nuclear Cooperation in Asia (FNCA), with the aim to promote regional cooperation in nuclear science and technology related fields. Most IAEA-supported projects and initiatives in 2009 fit very well with similar undertakings supported by these regional organizations.

30. ARASIA continues to support TCDC, addressing the development needs of Iraq, Jordan, Lebanon, Saudi Arabia, Syria, United Arab Emirates and Yemen. ARASIA projects in 2009 covered the coastal and marine management, environment, health, agriculture, nuclear analytical techniques, waste management and energy planning.

31. In Latin America, ARCAL's 25th anniversary took place in 2009. The plan of action for the institutional strengthening of the Agreement, approved at the end of 2008, was implemented in 2009, focusing on improving internal and external communication and developing strategic alliances. ARCAL is designing a virtual platform which will integrate the different components of the agreement and strengthen communication with relevant stakeholders. In this context, ARCAL is focused on seeking strategic alliances and partnerships for the TC regional programme, aiming not only to increase the resources available for TC projects but also to create positive synergies through better coordination with other organizations and UN agencies in the region.

Building partnerships at the national and regional levels

32. In Asia and the Pacific, active efforts to build strategic partnerships with donor countries and regional organizations continued in 2009, resulting in the participation of several donor countries in the implementation of TC activities in the region. The USA provided extrabudgetary contributions to fund activities for a project to enhance the capabilities of national institutions supporting nuclear power development in China, while Australia, China, Japan and the Republic of Korea provided extrabudgetary contributions to support RCA activities under the TCDC modality. The number of Member States interested in sharing the cost of national projects through building basic infrastructure also increased. Pakistan provided funds under the cost-sharing mechanism to improve its regulatory performance and nuclear facilities.

[8] Section A.1.4. responds to operative paragraph 22 of resolution GC(53)/RES/12 on consultations between the Secretariat and Member States on the support for and implementation of activities under regional cooperation agreements and arrangements.

33. An on-site evaluation of the fallout radionuclide methodology for soil erosion mapping and evaluation of soil conservation measures is currently underway in the Pamir Mountains under TAD/5/005, 'Developing Soil Conservation Strategies for Improved Soil Health'. In 2009, the first exploratory mission to the Pamir Mountains in 20 years was arranged. Project activities in Pamir are embedded in a UN-led undertaking in the High Pamir and Pamir-Alai Mountains, PALM. This integrated transboundary initiative of the governments of Kyrgyzstan and Tajikistan is funded by the Global Environment Facility (GEF) and more than ten co-financing organizations including the IAEA. In addition, the Swiss organization, National Centres of Competence in Research (NCCR) is closely involved. NCCR activities encompass a robust network of over 400 researchers active in more than 40 countries. The project addresses the interlinked problems of land degradation and poverty within one of Central Asia's critical mountain regions by promoting sustainable land management practices which contribute to improving the livelihoods and economic well-being of their inhabitants.

A.2. Delivering the technical cooperation programme[9]

A.2.1. Strengthening Member State capacities: Technical cooperation in 2009[10]

34. In 2009, the technical cooperation programme delivered support to 125 countries and territories, 3694 expert and lecturer assignments were carried out, 5090 participants attended meetings, 2493 people took part in 188 training courses and 1532 benefited from fellowships and scientific visits. The programme disbursed a total of $85.4 million, with an implementation rate of 77.3%.

A.2.2. Country Programme Frameworks and Revised Supplementary Agreements

35. Country Programme Frameworks (CPFs), prepared by Member States in collaboration with the Secretariat, define mutually agreed priority development needs and interests to be supported through technical cooperation activities. CPFs reflect national development plans, country specific analyses and lessons learned from past cooperation, and also take into consideration the UN Development Assistance Frameworks (UNDAFs). This helps to ensure that the application of nuclear techniques is integrated with existing development initiatives and plans, and supports the identification of areas where such techniques might be usefully deployed. Signed, valid CPFs facilitate national upstream work and provide a context for the preparation of the 2012–2013 TC programme.

36. Nineteen new CPFs were signed in 2009, by Cameroon, Cote d'Ivoire, Cuba, Dominican Republic, Egypt, Jordan, Kazakhstan, Kuwait, Lebanon, Mauritania, Mongolia, Myanmar, Pakistan, Senegal, Serbia, Sierra Leone, Sri Lanka, Sudan and Tunisia. A further 50 are in preparation. CPFs for Singapore and Malaysia were signed in early 2010.

37. Revised Supplementary Agreements (RSAs), governing the provision of technical assistance by the Agency, are in force in 110 Member States. The Secretariat strongly urges Member States that have not yet done so to conclude their RSA forthwith, as required under the Statute and INFCIRC/267. RSAs contain essential provisions, including safety standards and measures, and the transfer of title to equipment and materials.

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[9] Section A.2. responds to operative paragraphs 8 and 12 of resolution GC(53)/RES/12 on enhancing the effectiveness and efficiency of the TC programme and on strengthening TC activities, including the provision of sufficient resources.

[10] Section A.2.1. responds to operative paragraph 1 of resolution GC(53)/RES/12 on facilitating and enhancing the transfer of nuclear technology, taking into account specific needs of developing countries including LDCs.

A.2.3. Improving interaction with the United Nations system[11]

38. The Agency took part in the UNDAF process in Azerbaijan, Botswana, Kazakhstan, Mozambique, Tajikistan, Uganda, Ukraine and Zimbabwe in 2009, resulting in the signature of seven UNDAFs. The Engagement Note[12] for UNDAF Burkina Faso was also signed, covering the period 2011–2015. Although specialized and non-resident agencies are not obliged to use the harmonized programme cycle of the United Nations Development Group (UNDG) Executive Committee agencies, the Agency is committed to strengthen engagement in UNDAF joint programming, to achieve better national development outcomes and to leverage synergies among UN organizations.

39. Engagement in the UNDAF process also supports upstream preparation of the technical cooperation programme (planning and country programming), as well as monitoring, self-assessment and independent evaluation. At present the Secretariat is engaged in 22 ongoing UNDAF processes to ensure that TC programme activities are aligned with national development priorities and reflected in the UNDAF Action Matrix.

A.2.4. Evaluating technical cooperation: The OIOS reports

40. OIOS has reviewed the implementation status of recommendations from TC programme evaluations carried out between 2002 and 2008. Out of 183 fully or partially accepted recommendations made since 2002, 122 (66.7%) were fully implemented and actions to implement the remainder are ongoing. The implementation rate is higher than that reported in the 2008 Evaluation of Technical Cooperation Activities (GOV/2008/56), which was 59%. The increase in the rate of implementation is attributed in part to the successful expansion of the PCMF IT platform.

41. OIOS carried out four programme evaluations in 2009. These were: evaluation of selected projects on food irradiation related to trade; evaluation of the support to countries considering embarking on a nuclear power programme; evaluation of projects in areas related to research reactors; and the evaluation of the Agency's assistance to fight cancer in one selected region. In addition, the evaluation of Agency support to the Southern Rift Valley Tsetse Eradication Project in Ethiopia, initiated as a special study in 2008, was completed.

42. Common issues, such as limited baseline data availability and poor tracking of project results at the 'outcome' or 'impact' level, appeared in a number of the evaluations. In some cases, it was difficult to ascertain the impact of TC projects, as appropriate data had not been taken into account when planning project monitoring and evaluation. No baseline data existed to compare situations before and after. Evaluations noted that TC projects should be monitored more systematically and their benefits assessed in terms of the real achievement of project objectives and sustainability.

43. The evaluation of selected projects on food irradiation related to trade noted that such projects were relevant to the needs of the Member States but that food irradiation was still not recognized as a tool to address a development priority in the countries selected for the evaluation. It advised, inter alia, the identification of host institutions or implementation organizations, both public and private, that specialize in wider social and economic benefits such as food safety, food security or food trade.

44. The evaluation of the support to countries considering embarking on a nuclear power programme focused on 67 TC projects implemented between 2006 and 2009. The guidance paper 'Milestones in the Development

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[11] Section A.2.3. responds to operative paragraph 17 of resolution GC(53)/RES/12 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.

[12] The Engagement Note is the document signed by the representatives of resident and non-resident UN agencies in Burkina Faso highlighting the action plan and time frame for the formulation of the BKF UNDAF 2011-2015 document.

of a National Infrastructure for Nuclear Power', which maps the sequential development of activities required for initiating a nuclear power programme, was widely recognized by national authorities and project counterparts as a major reference guide for newcomers. The evaluation noted the long-term commitment required to develop a nuclear power programme, and recommended, inter alia, that options for strengthening project sustainability should be explored.

45. The evaluation of projects in areas related to research reactors assessed the effectiveness and efficiency of TC projects in regard to research reactor safety, decontamination and decommissioning, utilization and fuel improvement. The TC projects related to utilization for isotope production were found to be instrumental in contributing to public policy goals. The evaluation noted that the projects contributed to building indigenous expertise and capacity, and that they contributed to cooperation and mutual support among the Member States. The regional approach resulted in significant benefits, both tangible and intangible, such as the execution of complex activities, and regional team work.

46. The evaluation of the Agency's assistance to fight cancer in Africa assessed the extent to which TC projects have enabled Member States in Africa to introduce, expand and improve their cancer control capacity. The evaluation found that progress had been made in strengthening capacities for cancer care, but that action needed to be taken in several areas, including project planning, linkages with existing human resources and the capacity-building strategy on cancer of the country, assessments against quality criteria, project ownership and sustainability and monitoring data. Efforts are being made to use the imPACT review mechanism to assess the needs of Member States in cancer control.

47. The evaluation of Agency support to the Southern Rift Valley tsetse eradication project in Ethiopia assessed the extent to which the project had progressed in creating tsetse-free zones in Ethiopia and identified issues to be addressed before the project moves to its final phase.

A.2.5. Managing the technical cooperation programme

Managing for quality and impact[13]

48. Throughout 2009, emphasis was placed on strengthening the results based management (RBM) approach, applied progressively in the TC programme since 1997 and in the Agency since 2002. A number of Member States are already actively involved in promoting and applying RBM approaches at the national level. At the regional level, RBM is applied through enhanced management of cooperative programmes under Regional Agreements and groupings. The Secretariat provides RBM training to Member States upon request.

49. Work continued throughout 2009 on updating the TC Operations Manual and on establishing the Documents Repository Management System. Improvements have been made to the TC programme planning and design process, including the further articulation of comprehensive quality criteria that are applied at both the concept and design phases.

50. A major enhancement to the PCMF platform during 2009 was the introduction of the Periodic Reporting Module, which harmonizes reporting on project progress across all four Regional Divisions by providing a standard reporting format for national, regional and interregional projects. New reporting tools were created to track reporting status and to present report contents in different formats. The PCMF platform was enhanced to provide Member State users with access to the reporting functionality, and TCPRIME was updated to provide Agency staff with access to the reports.

[13] This section responds to operative paragraph 23 of resolution GC(53)/RES/12 on continuing to implement the Programme Cycle Management Framework

Quality criteria and performance indicators

51. Baseline data for eight programmatic indicators to measure implementation of the TC programme over the course of the year were established over 2008 and 2009. These data support the monitoring of indicators that include the financial implementation rate and net obligations (to measure timely financial performance); Member States with CPFs (to ensure that all Member States have a valid CPF); quantity and value of budget revisions (to measure the efficiency of programme budgeting); and number of projects closed (to ensure and encourage the timely closure of projects).

Encouraging balanced gender participation

52. TC activities strive to further gender equality by including gender considerations in the TC programme, providing guidance in the CPF Guidelines, and encouraging the participation of women as experts, trainees and fellows. In 2009, 3334 women from all regions participated in the TC programme, either as counterparts, trainees, meeting participants, experts or lecturers, a slight fall from the 2008 total of 3555 and the 2007 total of 3553.

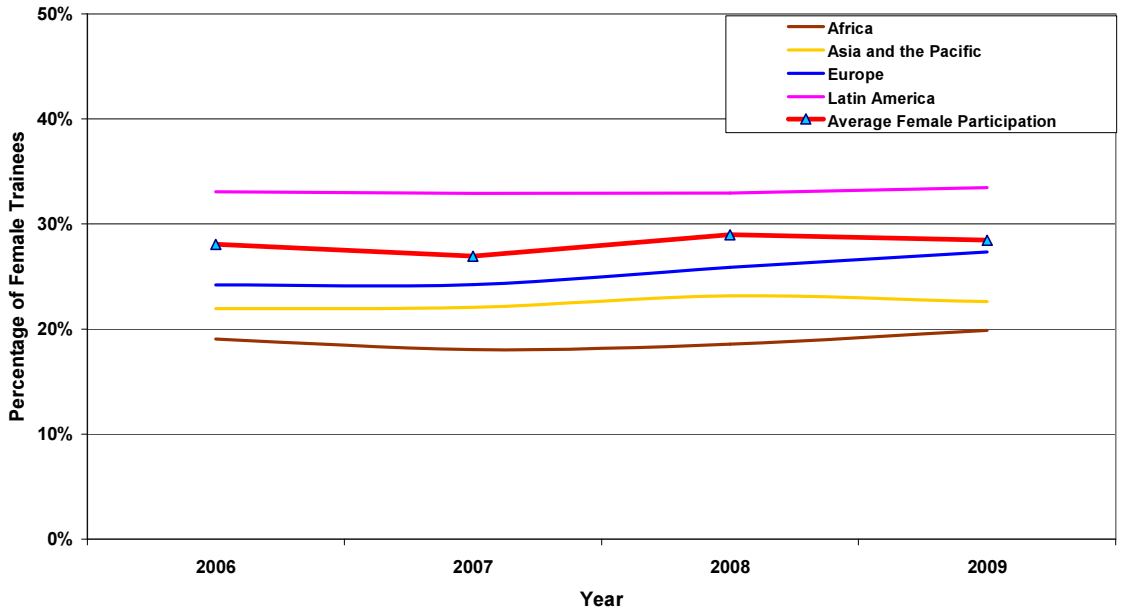

Figure 3: Female participation in training 2006–2009, by region.

Enhancing outreach[14]

53. Several new outreach products, including new project success stories and a CD of technical cooperation publications from 2007 to 2009, were produced in 2009. Support was provided for a suite of AFRA outreach materials, which included a folder, six success stories and a brochure, 'AFRA: Fostering Nuclear Science and Technology for African Development'. Over 14 000 outreach products were distributed, including more than 9000 copies of project success stories, 2600 brochures and 400 CDs. Outreach material was distributed at meetings, workshops and exhibitions and was also used to support staff travel and missions.

54. The TC exhibition was used to support several meetings in Vienna: International Symposium on Uranium Raw Material for Nuclear Fuel Cycle, NESA Tool Workshop and the 53rd General Conference TC service desk.

The TC exhibition was also displayed during the 20th AFRA Technical Working Group Meeting in Yaoundé, Cameroon, and at the 53rd General Conference an exhibition of AFRA successes in the form of posters and outreach materials was displayed during the Panel Discussion for the Celebration of the 20th anniversary of AFRA.

55. TC activities and achievements were also promoted through the IAEA and TC websites, and via press notes and radio interviews. Seventeen web stories were produced during 2009, including stories on CPF signings, visits to projects and regions, and project successes such as Ghana's development of a comprehensive National Cancer Control Strategy. A number of press notes were distributed to support TC projects and events and several radio interviews in English and Spanish were broadcast through UN Radio, reaching numerous local radio stations

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Technical cooperation exhibition at the 20th AFRA Technical Working Group Meeting in Yaoundé, Cameroon.

[14] This section responds to operative paragraph 14 of resolution GC(53)/RES/12 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 2009

56. As of 31 December 2009, pledges against the 2009 Technical Cooperation Fund (TCF) target totalled $79.9 million (not including TCF payments for previous years, national participation costs (NPCs), assessed programme costs (APCs) and miscellaneous income) or 94.0% of the $85.0 million target. The rate of attainment, based on the figure of $77.5 million received as at 31 December 2009, was 91.1%, reflecting unpaid pledges of slightly less than $2.4 million (much of this was subsequently received in January 2010). Total TCF resources (including payments for previous years, NPCs, APCs and miscellaneous income) amounted to $86.1 million. Total resources and net new obligations for the 2009 TC programme were high, showing a substantial increase from 2008 figures (Fig. 4).

B.2. Technical Cooperation Fund[15]

B.2.1. New resources

57. New resources for the TCF in 2009 reached $86.1 million (including TCF payments for previous years, NPCs, APCs and miscellaneous income). This increase from the previous amount of $79.9 million in 2008 reflects the fact that the TCF target increased from $80.0 million in 2008 to $85.0 million in 2009. The rate of attainment, on pledges, reached 94.0% as of 31 December 2009. Miscellaneous income as a net result of gain/loss on exchange, interest income and bank charges totalled approximately $0.5 million in 2009.

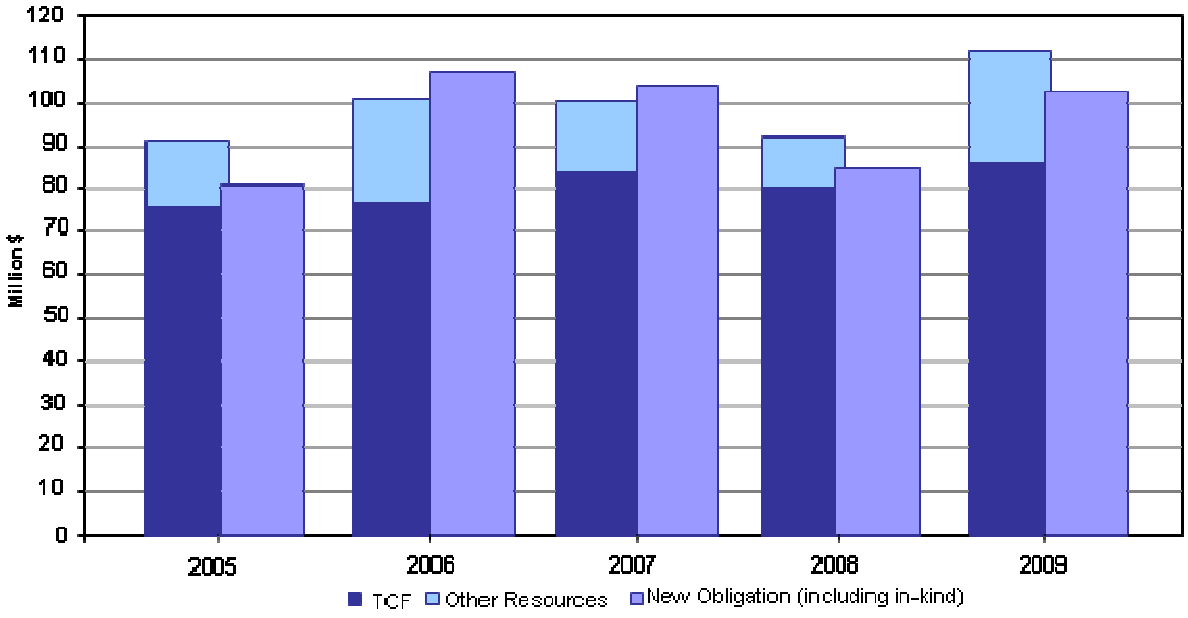

Figure 4: TCP resources and new obligations between 2005 and 2009.

[15] Section B.2. responds to operative paragraphs 2, 3, 6 and 7 of resolution GC(53)/RES/12 on facilitating the process for setting the TCF targets, establishing means and mechanisms to achieve making TC resources sufficient, assured and predictable (SAP), and timely payment of TCF contributions, NPCs and payment of APC arrears.

B.2.2. Payment of National Participation Costs and assessed programme costs arrears[16]

58. Payments of National Participation Costs totalled $4.3 million out of a total of $5.2 million, leaving outstanding payments of some $0.9 million.

59. In December 2008 the Secretariat sent letters of invoice for NPCs to 91 Member States with reference to the new TC programme for the 2009–2011 triennium. The Secretariat makes every effort to confirm deposits of NPC payments as quickly as possible so that projects can be made operational. Until that point, the Secretariat takes whatever actions it can to begin planning the implementation of the project in accordance with the agreed work plan. However, under the rules applicable to NPCs, contracts that result in financial obligations may only be signed when a project is fully funded. Thus, the Secretariat must exercise caution to ensure that the guidelines are strictly followed.

60. 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 could not start at the beginning of the cycle. It is of some concern that approximately the same number of countries as in 2005 and 2007 had not paid the minimum NPC amount by the end of the first quarter of 2009. However, by the end of 2009, all Member States had paid sufficient NPCs to make their new projects operational.

61. About $0.4 million was also received through payments of outstanding arrears in assessed programme costs. As at 31 December 2009, the amount of arrears still outstanding for APCs was some $2.4 million.

B.2.3. Extrabudgetary contributions and in-kind contributions

62. Extrabudgetary contributions from Member States and international organizations accounted for some $18.4 million in new resources, with some $0.8 million of that coming from Nuclear Security Fund resources used to implement activities through TC projects. An additional $5.9 million was provided by Member States to support activities in their own country (government cost sharing). Figure 5 presents the extrabudgetary resources received over the past ten years, broken down by donor type. In-kind contributions accounted for $1.5 million in 2009.

63. Extrabudgetary resources in 2009 show a significant increase from 2008. Extrabudgetary contributions from all sources (donor countries, international and bilateral organizations, government cost sharing) increased, in particular from donor countries ($7.7 million from Russia and $2.5 million from the USA) and international organizations ($4.8 million from the European Commission for the safe removal of spent fuel).

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[16] Section B.2.2. responds to operative paragraph 9 of resolution GC(53)/RES/12 on ensuring the commencement of projects upon receipt of at least the minimum payment of the NPCs.

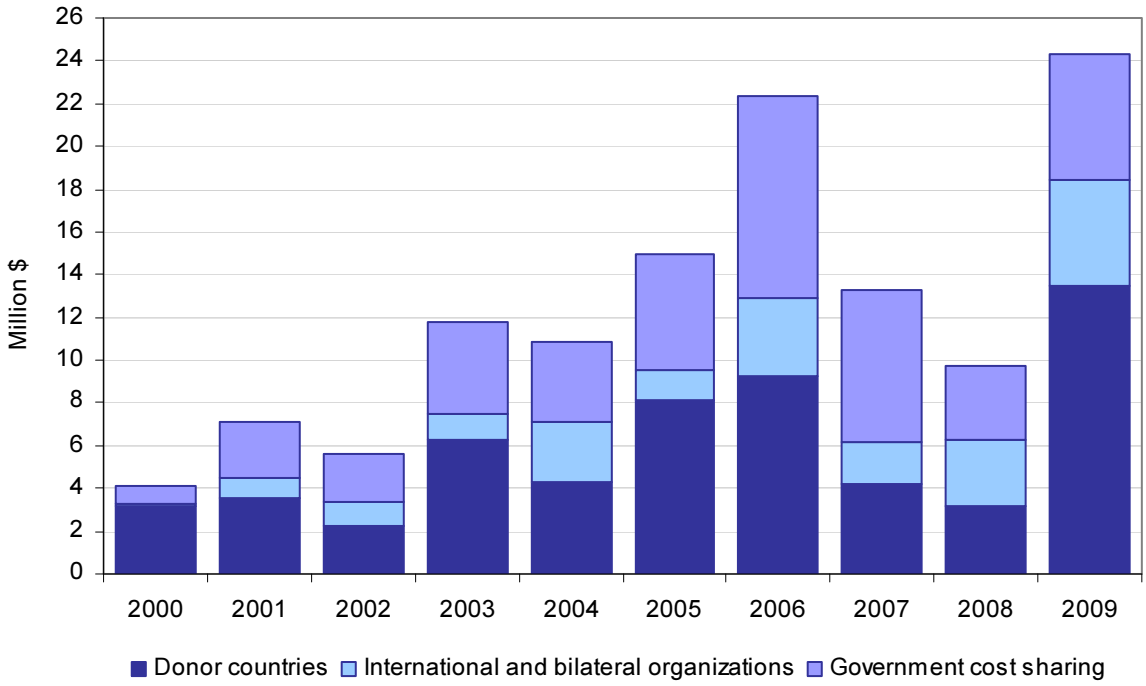

Figure 5: New extrabudgetary resources between 2000 and 2009.

B.3. Programme delivery

64. 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 delivery (i.e. outputs) can be expressed numerically in terms of, for example, experts deployed, training courses conducted or purchase orders placed. For the programme as a whole, new resources stood at $110.9 million. Implementation, measured against the adjusted programme for 2009, reached a rate of 77.3% ($101.0 million for net new obligations against $130.7 million for the adjusted programme), well above the rate of 72.9% attained in 2008 (Table 1).

B.3.1. Human resource and procurement indicators

65. Human resource and procurement indicators (non-financial delivery indicators) for 2009, compared to 2008, show a substantial increase in expert and lecturer assignments, and in the number of meeting participants and other project personnel (Table 2). The total number of training courses (and related participants) and of fellowship remains stable. Procurement shows an increase compared to 2008. The Supplement to this report gives a more detailed presentation of delivery in 2009, using both financial and non-financial indicators.

Indicator	2008	2009	Increase/(decrease)
Adjusted programme	113 993 330	130 720 675	16 787 345
Net new obligations	83 086 573	101 001 299	17 914 726
Implementation rate	72.9%	77.3%	4.4%
Disbursements (including in-kind)	94 601 427	85 366 795	(9 234 632)

Table 1: Delivery of outputs: financial indicators for 2008 and 2009.

Indicator	2008	2009	Increase/(decrease)
Expert and lecturer assignments	3240	3694	454
Meeting participants and other project personnel	3676	5090	1414
Fellowships and scientific visitors in the field	1621	1532	(89)
Training course participants	2744	2493	(251)
Training courses	177	188	11
Purchase orders placed	2064	2466	402
Subcontracts issued	5	5	0

Table 2: Delivery of outputs: non-financial indicators for 2008 and 2009.

B.3.2. Financial indicators: Utilization of TCF resources

66. In financial terms, implementation of the TCF (excluding extra-budgetary projects) was high. New obligations, the measure that most closely indicates (in financial terms) the delivery set in motion during the year, reached $85.5 million, a TCF implementation rate of 80.2%, considerably up from $73.5 million in 2008. Disbursements under the TCF were down slightly in 2009, accounting for $71.6 million, as compared with $80.9 million in 2008.

B.3.3. Unobligated balance

67. The unobligated balance at the end of 2009 was $26.3 million, just slightly higher than that at the end of 2008. Table 3 presents a comparison of the TCF unobligated balance over the past five years. Out of the total of $26.3 million at the end of 2009, some $3.4 million represents pledges which had not yet been paid as at 31 December 2009 (of the latter amount, some $2.4 million for the 2009 TCF contribution was received early in January 2010). $13.7 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 $9.2 million at the end of the year.

Description	2005	2006	2007	2008	2009
Total unobligated balance	25 954 000	19 626 000	19 336 711	25 649 096	26 255 064
Pledges not yet paid	(1 638 570)	(1 642 125)	(1 142 148)	(993 287)	(3 352 995)
Non-convertible currencies that cannot be utilized	(12 004)	(12 090)	(8 239)	(11 911)	(11 839)
Currencies that are difficult to convert and can only be used slowly	(7 442 196)	(8 681 250)	(6 945 906)	(12 166 564)	(13 709 757)
Resources that can be used for TC programme obligations	16 861 230	9 290 535	11 240 418	12 477 344	9 180 474

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

C. Programme Activities and Achievements in 2009[17]

68. The TC programme is driven and guided by the priority needs of Member States, with the overarching goal of contributing to their socioeconomic development. The programme helps Member States to develop capacities to apply nuclear technologies that have proven to be suitable in addressing priority development needs, and builds partnerships at every level, from counterparts up to other international organizations, in order to best leverage all available support. The programme has a track record of achievements and is based on five decades of dialogue and interaction with Member States. The programme focuses on improving human health, supporting agriculture and rural development, helping water resource management, advancing sustainable energy development, including the option of nuclear power for electricity, addressing environmental challenges, and promoting nuclear safety and security.

69. Trends in the level of activity per sector can be represented in several ways. For example, increases and reductions in sectoral areas are clearly visible in each new TC programme cycle. This allows a biennial trend overview. Also, trends can be measured in programme distribution on an annual basis and can indicate Member State support to the implementation of activities in key sectors. This is easiest to track at the regional level. Programme distribution in 2009 differed considerably both between the regions and from the previous year. Food and agriculture remained high in Africa, and accounted for 26%. In Asia and the Pacific, food and agriculture accounted for 17%, a rise from 2008's figure of 11.7%. Human health accounted for 29% in Africa, an increase from the 2008 figure of 26.3%, for 19% in Europe and Latin America (36.4% and 28.6% in 2008, respectively), and remained at 16% in Asia and the Pacific (15.5% in 2008).

70. Globally, current trends point to a significant expansion in the use of nuclear power. More than 60 countries — mostly in the developing world — have informed the Agency that they might be interested in launching nuclear power programmes. Of these, 12 countries are actively considering nuclear power, either by including it in the prospective energy mix or an energy development policy. Fifty-eight Member States are participating in regional or national technical cooperation projects related to the introduction of nuclear power. Seventeen of these are preparing national nuclear power programmes, two had active bidding processes in 2009 on their first nuclear power plants, and one has its first nuclear power plant under construction. The increased interest among Member States led to a three-fold increase in technical cooperation projects related to this area in the 2009–2011 TC cycle.

71. At the regional level, building human resource capacity remains the single most important area of activity in the TC programme in Africa, in every sector. Human health remained the top sectoral priority, with significant activity in support to cancer treatment facilities and the establishment or upgrade of nuclear medicine facilities. Agricultural productivity and food security also remained high on the agenda in the region, with crop improvement, water resource management and soil fertility, and livestock breeding all showing strong results in 2009. In Asia and the Pacific, the surge in interest in nuclear power noted in 2008 continued, although this is not directly reflected in the percentage of programme disbursement. Top areas for disbursement in the region were split fairly evenly between human

[17] Section C. responds to operative paragraphs 5, 13, 18, 20 and 21 of resolution GC(53)/RES/12 on: identifying regional resource centres and developing SMART partnership mechanisms; ensuring that the components of TC projects are readily available and meets international quality standards; helping Member States to obtain information on (a) the role of nuclear power in mitigating GHG emissions and (b) the role of radiation and nuclear technology in mitigating polluting gases, in managing agricultural and industrial wastes, and improving water security; examining the specific characteristics and problems of the developing countries and LDCs; and supporting the self-reliance, sustainability and further relevance on national nuclear and other entities in Member States

health, food and agriculture, nuclear safety, and radioisotope production and radiation technology. Important progress in distance assisted training was achieved in 2009, and several projects in the area of industrial applications are reporting progress. In Europe, reinforcing nuclear and radiation safety infrastructure in accordance with IAEA safety standards remained a key priority for Member States, and support was offered in some cases to facilitate compliance with certain international, national or regional commitments. In Latin America, an upswing in activity related to the food and agriculture sector reflects how the food security crisis continues to affect the region. The sterile insect technique is being widely applied in support of the fruit and horticultural sectors, and nuclear techniques are helping Member States to deal with the incidence of harmful algal blooms, a major problem for areas with an economic dependence on fisheries.

C.1. Interregional projects

72. Interregional projects deliver TC support across national and regional boundaries and address the common needs of several Member States in different regions. They are categorized as trans-regional, global, capacity building or joint activities. Interregional projects represent the smallest portion of the TC programme. In 2009, a total of $2.6 million was disbursed under interregional projects out of the total TC disbursement of $85.4 million, mostly in human capacity development. This section provides a brief overview of some interregional project activities and achievements in 2009.

73. INT/4/142, 'Promoting Technology Development and Application of Future Nuclear Energy Systems in Developing Countries', uses INPRO methodology to build up a technical capability in developing countries interested in nuclear power programmes, and to establish a dialogue between technology holders and technology users, and among the developing countries involved in nuclear power planning. In 2009 lessons from INPRO assessment studies were exchanged, assessment tools for long term planning and development of nuclear energy systems were introduced to the counterparts, and the first INPRO Dialogue forum between technology holders and technology users was prepared. The participation of Member States in several conferences on new reactor technologies was also supported.

74. INT/7/017, 'Providing Coordinated Support in the Use of Receptor Binding Assay to Address Impacts of Harmful Algal Toxins in Seafood', complements on-going national and regional projects on Harmful Algal Bloom to ensure coordinated Agency support for the reliable supply of radio-labelled toxins to Member States to support the adoption of receptor binding assay (RBA) techniques, and facilitates further regulatory acceptance of RBA technology by supporting analytical collaborative trials and certification. Under the project, a Scientific Advisory Committee on HABs has been created.

75. INT/6/054, 'Strengthening Medical Physics in Radiation Medicine', promotes the recognition of medical physics in radiation medicine and aims to harmonize educational material in order to ensure safe and effective diagnosis and treatment of patients. The medical physicist fulfils an essential role in the use of radiation in medicine, most commonly in cancer treatment and various types of radiation diagnosis. The project addresses the critical shortage of fully competent medical physicists in the developing world. In 2009, two coordination meetings took place, bringing together medical physicists from professional societies including the International Organizations for Medical Physics, the European Federation of Organisations for Medical Physics, the American Association of Physicists in Medicine (AAPM), the Latin American Association of Medical Physics (ALFIM), the Asia-Oceania Federation of Organization for Medical Physics (AFOMP), the European Society for Therapeutic Radiology and Oncology (ESTRO), the World Health Organization (WHO), the European Commission (EC), and the International Radiation Protection Association.

76. INT/5/150, 'Responding to the Transboundary Threat of Wheat Black Stem Rust (Ug99)', aims to facilitate and coordinate a network of laboratories as a defence line against this disease in high risk countries. The pandemic

of wheat stem rust spread by Ug99 is considered the most serious threat to wheat and barley in 50 years. The threat has already caused an increase in wheat prices, as all commercial varieties are sensitive to the disease, and also threatens barley. Sixteen countries from Africa and Asia and the Pacific are participating, as are a range of interested partners, including FAO, the International Center for Agricultural Research in the Dry Areas (ICARDA) and the International Maize and Wheat Improvement Center (CIMMYT), among others. In 2009, achievements included the identification of gaps and bottlenecks in the mutant germplasm exchange pipeline, and, unexpectedly, a number of mutants from the first year's test run of mutant germplasm showed promising increased resistance, although these very preliminary observations need to be consolidated.

INT/5/150 field visit at Moi University, Egerton, Kenya.

C.2. Africa

C.2.1. Africa region at a glance

77. In 2009, the TC programme in Africa was implemented in 39 countries, of which 20 are least developed countries. As of 31 December 2009, new obligations amounted to $26.4 million. An increased commitment and pro-active involvement in programme management on the part of NLOs and project counterparts was reflected in the increased efficiency of project management and the high level of programme delivery achieved in 2009. The financial implementation rate for 2009 was 78.5%. The distribution of disbursements in the region for 2009 by area of activity is shown in Figure 6.

- Disbursements for the TC programme in Africa **$24.7 million**
- Net new obligations in Africa for 2009 **$26.4 million**
- Implementation rate for the programme **78.5%**
- Number of countries receiving support **39**
- **672** expert and lecturer assignments, **748** meeting participants and other project personnel
- **820** participants in training courses, **557** fellows and scientific visitors

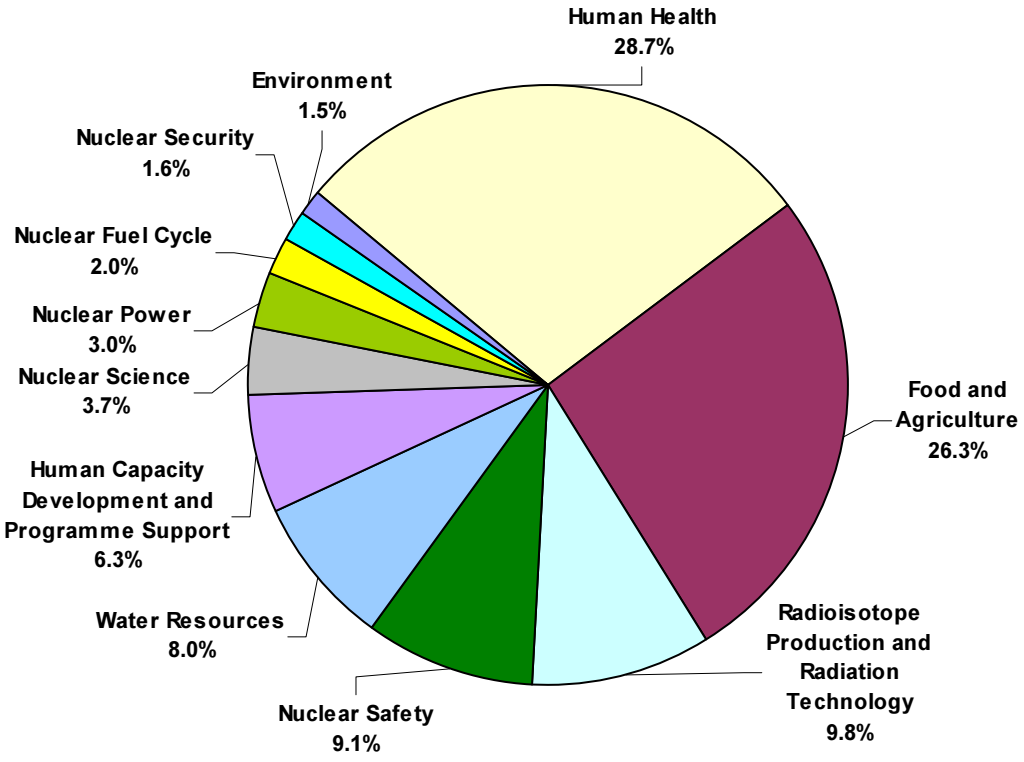

Figure 6: Disbursements by Technical Field for 2009 – Africa.

C.2.2. Human health

78. In Algeria, the Department of Radiotherapy at Blida Anti-Cancer Centre (ACC) treats up to 1,600 patients each year – each day, 40 patients are treated with the linear accelerator and 130 patients are treated with the two cobalt units. The Agency is supporting improvements in national radiotherapy capability through ALG/6/013, 'Improvement of Radiation Physics Capability in Radiotherapy', and commissioned a new state of the art stereotactic radiotherapy facility in March 2009. The Government provided premises, up-to-date radiotherapy calibration, dosimetry and QC equipment, and upgraded the linear accelerator housed at ACC to accommodate stereotactic radiotherapy, which up till then had been performed abroad. Expert services and fellowship training were provided on various aspects of stereotactic radiotherapy, and a Brainlab radiosurgery kit was supplied to upgrade the linear accelerator. As a result, the Department of Radiotherapy at the ACC has been performing stereotactic treatment for patients as of March 2009.

79. In Uganda, cancer patients number more than 25 000 per year, over half of whom would benefit from radiation therapy. However, in 2005 Uganda had only one functional teletherapy unit, at Mulago Hospital in Kampala. TC project UGA/6/013, 'Human Resources in Support of the Expansion of the Radiotherapy Service', trained key personnel to run an expanded national radiotherapy service, and helped the Government prepare a comprehensive plan to extend the Mulago facility and re-activate the facility at St Mary Hospital, Lacor. The Government is using the bankable document produced to approach donors for funding for the planned expansion. As a result of the project, a body of trained key personnel, including radiation oncologists, medical physicists, three therapy radiographers, two oncology nurses and a maintenance technician, is now running the Mulago Hospital radiotherapy centre, and the Centre is able to treat at least 80 out of every 1000 cancer patients.

80. The Yalgado Ouédraogo Teaching Hospital in Ouagadougou is the biggest hospital in Burkina Faso and a national reference hospital for radiation. However, nuclear medicine, appropriate for cancer treatment and for diagnosis following functional and metabolic imaging, was not available anywhere in Burkina Faso, and patients had to be sent abroad for treatment. Through BKF/6/002, 'Establishment of a Nuclear Medicine Centre', two nuclear medicine physicians, two technologists and a radiographer have been trained, and new therapy procedures are available using rhenium-188 labelled radiopharmaceuticals. The newly established Nuclear Medicine Centre can provide diagnosis and therapy for patients in need of radiotherapy, and patients do not need to seek treatment abroad.

81. TC project SEN/6/013, 'Upgrading Nuclear Medicine Services', aimed to upgrade the nuclear medicine capability in Grand Yoff University Hospital in Dakar by applying in vivo nuclear medicine techniques for the management of diabetes mellitus and for the diagnosis, management and treatment of thyroid and oncological diseases. The hospital's Nuclear Medicine Department is now fully operational, with clinical protocols in place and capabilities in the quality management of nuclear medicine. Nuclear imaging activities have increased significantly, mainly related to myocardial, bone, lung, kidney and thyroid imaging. By October 2009 150 to 200 patients were being treated per month. Radiopharmaceutical kits are being provided out of the hospital's own budget.

82. Thalassemia is a chronic disabling disease widespread among Egyptian children. Under project EGY/6/008, 'Screening of Osteoporosis and Assessment of Bone Mineral Density of Egyptian Thalassemic Pediatric Patients Using Dual Energy X Ray Absorptiometry', the Agency has supported the development of an effective Osteoporosis Screening Unit at the Institute of Postgraduate of Childhood Studies in Cairo. Paediatric patients are now screened for osteoporosis, resulting in early diagnosis and treatment of bone complications in thalassemic patients. This early diagnosis is expected to reduce the socioeconomic, psychological and health problems that result from thalassemia.

83. TC project GAB/6/004, 'Establishment of a Neonatal Mass-screening Programme for Prevention and Control of Sickle Cell Disease', aimed to establish molecular diagnostic techniques for sickle-cell disease with the aim of reducing infant morbidity and mortality in Libreville and Franceville. Neonatal screening techniques using nuclear technology were used to identify babies with SCD, allowing the start of life-extending prophylactic penicillin and comprehensive care. As a result of the project, diagnostic information on newborns and affected adults can be provided within ten days. To date, 2,471 newborns have been screened from various hospitals in Gabon. A cost benefit analysis has shown that early diagnosis and the Continuous Comprehensive Care Programme (CCCP) cost Euro 15, whereas costs for later complications and death are Euro 6000. The project has reduced national health care costs, and benefits from high level government involvement, including the support of the First Lady of Gabon.

Neonatal screening in Gabon for the prevention and control of sickle-cell disease.

84. In South Africa, SAF/6/008, 'Control of Drug-resistant Tuberculosis', addressed the spread of drug-resistant tuberculosis (TB) in a high-incidence area through the use of molecular methods to rapidly detect drug resistance in Mycobacterium tuberculosis. Drug-resistant strains of TB, especially multi-drug-resistant strains, pose a threat to the success of national TB control programmes. Through the project, routine TB diagnosis was successfully established at the counterpart institute, and qualified staff from the Western Cape National Health Laboratory Service were trained in molecular testing. On average the molecular, nuclear method of testing takes 20 days – the conventional method takes twice as long. This is of socioeconomic benefit as undetected patients will continue to transmit drug resistant TB.

85. In Ethiopia, drug-resistant malaria is a significant problem. In 1999, the high rate of resistance to chloroquine (CQ), an anti-malaria drug, led to a national change from CQ to sulphadoxine-pyrimethamine as a first line drug. However, recent in vivo studies revealed that the national average of SP treatment failure is at 36%. Through ETH/6/012, 'Molecular Detection of Drug-resistant Malaria', the Agency supported the transfer of polymerase chain reaction (PCR) technology for surveillance of drug resistance in malaria. As a result, the

management and treatment of patients suffering drug-resistant malaria has improved and more scientific evidence based information on the levels of SP and CQ resistance is available.

C.2.3. Agricultural productivity and food security

86. AFRA project RAF/5/056, 'Field Evaluation and Dissemination of Improved Crop Varieties using Mutation Breeding and Biotechnology Techniques', focuses on the development of improved food crops, not only with higher agricultural productivity and sustainability, but also with better nutritional value and improved market orientation. The project also focuses on the genetic improvement of underutilized and neglected crops such as Bambara groundnut, colocasia, African yam bean and cocoyam. Through the project, new varieties of five crops have been released in Egypt, Sudan, Kenya and Zambia, and partnerships in the private sector have been initiated in Tanzania and Zambia. In 2009, the project included traditional and neglected crops that are developed for their ecological characteristics, such as date palm, jack bean, Chinese yam, sweet potatoes and cassava.

87. In Mali, MLI/5/021, 'Sustainable Intensification and Diversification of Sorghum Production Systems in the Southern Zone of Mali', aimed to increase the production of sorghum by improving the effectiveness of nitrogen fertilization. Promising varieties of sorghum with shorter stems, a shorter growing period and higher yield were developed through plant breeding and mutation induction under MLI/5/014, and are now available to farmers. Initial trials indicate that they outperform local cultivars: selected mutants gave an increased yield of 25–35% in farmers' fields. An assessment of nitrogen fixing legumes in the cropping system showed that rotation between sorghum and cowpea resulted in a low- or no-cost alternative nitrogen fertilizer, as cowpea is a natural fertilizer. Rotation also has a direct, positive impact on food security as cowpea has a high energetic value. Women in the community are being trained on ways to use and preserve cowpea as a foodstuff.

88. In South Africa, SAF/5/008, 'Mutant Amaranth, Bambara Groundnut and Cowpea with Enhanced Abiotic Stress Tolerance', addressed low crop productivity and yield and poor resistance to disease and abiotic stress. Using biochemical, physiological and genetic techniques, drought tolerant mutant lines of amaranth and cowpea were evaluated to ensure that the trait was stable over generations. Promising lines were also evaluated by farmers for taste and acceptability, and were released for planting in marginal areas. The crops are high in proteins and vitamins (especially vitamin A) and will contribute significantly to food security and poverty alleviation in South Africa..

89. Agricultural productivity in Kenya is limited by inadequate water and low soil fertility in the dry lands. KEN/5/026, 'Isotope Techniques for Assessment of Water and

Women and farmers of Zanguena, Mali, harvesting cowpea.

Nitrogen Use Efficiency in Cowpea and Maize Intercropping Systems', studied the effects of tied-ridges on water conservation (soil water storage), with the aim of developing suitable and dependable integrated rainwater harvesting and nutrient management options that could be used by the farming community for cowpea and maize intercropping systems in arid and semi-arid lands (ASALs). The project used on-farm demonstrations to show the effect of different rainwater conservation practices, tillage methods and manure application on soil water conservation and crop production. The project was funded by the IAEA, Kenya Arid and Semi-arid Lands Programme and the Government of China.

90. In Madagascar, under MAG/5/015, 'Optimization of Phosphate Fertilization of Ferralsols in the Highland Areas of Madagascar', the Agency built, in partnership with the French National Institute for Agricultural Research, national capacity to enhance food security for small land-holders in the Malagasy uplands. Crop productivity was increased through appropriate management of soil and nutrients inputs in rain-fed cropping systems. The project focussed mainly on the improvement of phosphorus availability in Malagasy cropping systems through a better understanding of the phosphorus cycle in the soil. Data on phosphorus fertilizer use were collected, which will support improved agricultural practices in the country. The 'Service de la Radioagronomie' and the University of Antananarivo have now the needed capacity to further improve soil and crop management to overcome phosphorus deficiency in Madagascar's infertile *Tanety* soils.

91. In Angola, ANG/5/007, 'Improvement and Veterinary Assistance to Local Small Breeds', addressed low productivity in small stock breeds – especially the Persian sheep which is the typical breed in southern Angola – and improved the national system for monitoring and diagnosis of transboundary animal diseases. Capacity was built in the diagnosis and monitoring of disease outbreaks and the functional capacities of the Veterinary Research Institute's five Laboratories were strengthened. As a result of the project, the Institute's laboratories are providing regular diagnostic services for parasitic diseases such as mange, nematodes and tape-worms and are fully engaged in animal disease surveys for trypanosomiasis, brucellosis, tuberculosis, contagious bovine pneumonia, and parasitic diseases. The surveys help in the assessment of disease outbreaks patterns and distribution and support the medical and sanitary control measures carried out by the Angolan Veterinary Service Authorities.

92. In Tanzania, URT/5/025, 'Support for the Delivery of Artificial Insemination Services', assists the sustainable intensification of milk and meat production through the provision of efficient and reliable artificial insemination (AI) services. With fellowships, a scientific visit and the provision of equipment, the capacity of the National Artificial Insemination Centre of Tanzania has increased from 15 000 to 60 000 inseminations per year. The intake capacity for training of inseminators and technicians has also increased from 47 to 207 trainees per year.

93. In South Africa, project SAF/5/009, 'Preparations for the Creation of a Zone Free of *G. brevipalpis* and *G. austeni'*, addressed an outbreak of African Animal Trypanosomosis, or Nagana, caused by two species of tsetse fly. The project aimed to develop tsetse fly rearing capacities and to implement pre-operational field activities in preparation for a sterile insect technique (SIT)-based area-wide intervention campaign. A viable colony of the two target species has been maintained at ARC-OVI, allowing for the provision of seed pupae to a planned mass rearing facility. Protocols for sterile male handling, transport and release procedures have been developed.

C.2.4. Water resource management

94. Lusaka, Zambia, faced a threat to water resources from pollution caused by human activity in the region. The results from ZAM/8/009, 'Use of Isotope Techniques in Sustainable Development and Management of Groundwater Resources', suggest that the quality of groundwater in Lusaka is not extremely critical, but is under threat, considering its hydrodynamics and the high rates in population

growth and development of the city. Isotope data also suggest that recharge rates have not changed significantly for the past 20 to 25 years and that the hydrodynamics do not seem to be affected by an increase in groundwater exploitation. The determination of areas vulnerable to pollution and those where the main recharge occurs combined with information on groundwater flow paths is leading to development of groundwater protection measures. This ensures good quality water availability for the population of Lusaka as a whole.

C.2.5. Industrial applications

95. Under AFRA project RAF/4/021, 'Strengthening National Facilities for the Maintenance and Repair of Medical and Scientific Instruments', training was provided for engineers and technicians in partnership with medical and scientific instrument institutions and centres dealing with nuclear engineering in 25 participating Member States. Over one hundred scientific instruments were repaired, spare parts, troubleshooting tools and equipment were provided, and maintenance and repair services were made available in the region. The improvement in repair capability means that medical equipment is well serviced and equipment downtime is reduced. As a result, the number of patient receiving nuclear medicine treatment has increased in some countries. Income generation through repair and maintenance of scientific and medical equipment has been achieved in almost all centres, and the number of countries in the region that have designed, developed and produced some small instruments is increasing.

96. AFRA project RAF/8/040, 'Radioisotope Applications for Troubleshooting and Optimizing Industrial Processes', was implemented to maximize the application of radiotracer and sealed source technologies in solving specific technology problems in priority industrial sectors, increasing productivity and safety and reducing the environmental impact. The techniques have been applied in phosphate processing in Morocco and Tunisia, in gold processing and cement manufacturing in Ghana, and in chemical industries in several Member States.

C.2.6. Energy planning and nuclear power

97. A regional conference on 'Considerations for Embarking on a Nuclear Power Programme' was held in June 2009 in Cairo, Egypt, in conjunction with two regional TC project coordination meetings (RAF/0/028, 'Strengthening Planning Capabilities for Sustainable Energy Development (AFRA VI-1)', and RAF/0/033, 'Increasing Awareness at Decision Making Level about the Requirements and Challenges Related to the Feasibility of a Nuclear Power Programme'). The conference was attended by over 60 senior officials, experts and counterparts from 25 African countries, and provided a forum to debate regional priorities and concerns related to nuclear power. It also offered an opportunity for countries considering the introduction of nuclear power into their national energy mix to reflect on their own national conditions, environment and strategies.

98. A first coordination meeting under RAF/3/007, 'Strengthening Regional Capabilities for Uranium Mining, Milling and Regulation of Related Activities', was held in March 2009 in Maputo, Mozambique, attended by Cameroon, Chad, Egypt, Ethiopia, Gabon, Ghana, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Tunisia, Uganda, Zambia and Zimbabwe. Participants learned about IAEA activities in support of both uranium production and uranium legislation and regulation, and Member States elaborated on the status of uranium production cycle activities in their countries. The meeting discussed the need to identify opportunities for regional collaboration, including using existing uranium mining facilities in the region as training resources. Discussions also took place on the potential for adapting existing legislation from uranium producing countries to speed up development of new legislation in individual Member States, where required. The meeting stressed the need for legislation to cover all naturally occurring radioactive material, to avoid problems later on as other industries that might use radioactive minerals become established.

C.2.7. Nuclear safety

99. Under AFRA project RAF/9/038, 'Promoting Self Assessment of Regulatory Infrastructures for Safety and Networking of Regulatory Bodies in Africa', countries are helped to improve the performance of regulatory systems and to conform to international standards. The project promotes a methodological approach for self assessment of regulatory infrastructures to identify strengths and weakness and to initiate improvement plans, and supports the creation of a network of regulatory bodies. Three major regional training courses were organized for more than 100 regulators on regulatory systems, procedures for notification authorization, inspection and enforcement.

100. Legislative assistance was provided within the framework of regional project RAF/0/034 'Establishing a Legal Framework for the Safe, Secure and Peaceful Uses of Nuclear Energy' for review of draft nuclear laws. With Agency support, Uganda, Chad and Central African Republic have promulgated Nuclear Laws in 2009. Eight candidates from African Member States participated in the 2009 summer session of the International School of Nuclear Law in the University of Montpellier.

101. Under project NER/9/009, 'Development of Radiation Protection Monitoring of Workers in the Uranium Mining Industry', the Agency provided assistance to increase the protection of workers in the uranium mining sector. As a result, the Radiation Protection Centre in Niger has made good progress in the fields of notification, authorization, inspection and enforcement for the control of radiation sources, and individual dosimetry monitoring for persons working under ionising radiation (occupational exposure). Good progress has also been made in increasing enforcement of national law and regulations for authorization of radiation sources and inspections of users.

C.2.8. Nuclear security

102. Under AFRA project RAF/9/041, 'Developing Human Resources in Nuclear Security', the Agency helps AFRA Member States to develop sustainable human resources to improve their nuclear security infrastructures. The assistance focuses on human capacity building measures such as fellowships, regional training, technical visits, on-the-job training and the implementation of international legal instruments. The project is funded through the Nuclear Security Fund and trains law enforcement agencies (police, customs, and civil protection) and the radiation safety regulatory authorities from all AFRA Member States.

103. In 2009, five regional training courses were organized covering the area of physical protection of nuclear material and facilities, security of radioactive sources, nuclear security, safety and safeguards, information security and security in transport of radioactive materials. In addition, a regional training of trainer was provided to build up well-trained nuclear security instructors in the area of radiation detection techniques for front line officers. More than 140 participants from AFRA Member States were trained in 2009.

C.3. Asia and the Pacific

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

104. In 2009, the Agency provided technical assistance to 32 countries and territories in Asia and the Pacific[18], five of which (Afghanistan, Bangladesh, Myanmar, Nepal and Yemen) are least developed countries. A high volume of delivery was recorded with net new obligations amounting to $24.0 million and a financial implementation rate of 72.1%, notwithstanding the unfavourable security/political situation in some countries in the region. The distribution of disbursements in the region for 2009 by area of activity is shown in Figure 7.

105. A meeting of National Liaison Officers (NLOs) in Vienna addressed high priority issues and planned activities for future years, including the development of a regional cooperative framework for Asia and the Pacific. As part of the upstream work for the 2012–2013 programme cycle, consultations with national authorities and prospective project counterparts were carried out.

106. Programming and fact-finding missions to new Member States, including Oman and Nepal, helped national institutions to identify potential nuclear techniques to address national development problems.

- Disbursements for the TC programme in Asia and the Pacific **$18.6 million**
- Net new obligations in Asia and the Pacific for 2009 **$24.0 million**
- Implementation rate for the programme **72.1%**
- Number of countries and territories receiving support **32**
- **1081** expert and lecturer assignments, **1093** meeting participants and other project personnel
- **638** participants in training courses, **429** fellows and scientific visitors.

[18] 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 and document GOV/2008/47/Add.3 as approved by the Board on 27 November 2008 on the basis of TACC recommendations contained in document GOV/2008/61.

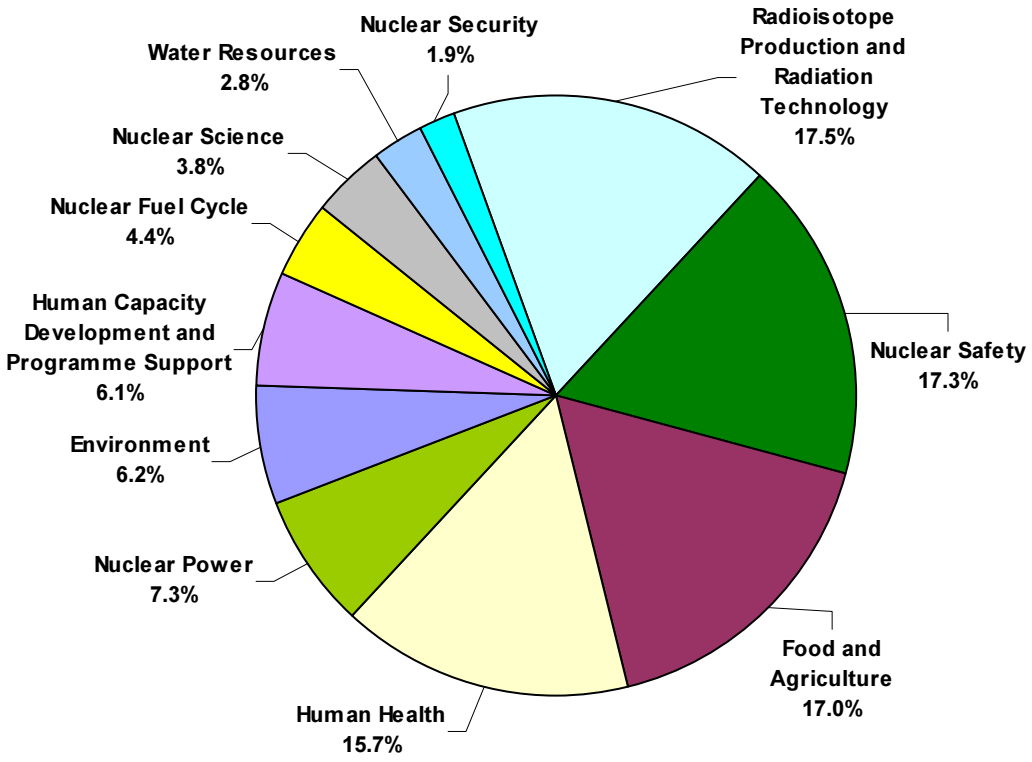

Figure 7: Disbursements by Technical Field for 2009 – Asia and the Pacific.

C.3.2. Human health

107. Activities to enlarge the scope and improve the quality of health care services in countries in the Asia region continued in 2009, with particular emphasis on quality assurance and quality control (QA/QC) and workplace safety. Activities to strengthen nuclear medicine and diagnostic techniques for the management of cancer and better diagnosis of cardiovascular diseases were also promoted. Another emphasis has been on planning the establishment of cyclotron and positron emission tomography (PET) centres. Working with the Programme of Action for Cancer Therapy (PACT), assistance was also provided in formulating comprehensive strategic plans for national cancer control. Under RAS/6/060, 'Supporting Comprehensive National Cancer Control', a planning and coordination meeting of counterparts from the region was held in collaboration with PACT, which identified cancer prevention and detection, cancer registry and palliative care as important areas for capacity building.

108. Under INS/6/012, 'Initiation of Radiotherapy Centre in Kalimantan', the Agency contributed training and equipment. Kalimantan's new centre is now fully operational and is handling cancer patients referred to it from the whole island. In Mongolia, the Agency provided assistance to the National Cancer Centre of Mongolia under MON/6/011, 'Improvement of Radiotherapy Services: Development of Quality Assurance Programme'. Under the cost-sharing mechanism, the Government of Mongolia provided funds of $50 000 for the purchase of radiotherapy equipment, while the Agency provided additional equipment worth more than $500 000. The assistance expanded the centre's capacity to manage cancer patients referred to it from the whole country

more effectively. The centre is capable today of handling a large number of cancer patients for various diseases and has significantly improved health care services as well as workplace safety.

109. Under RAS/6/052, 'Upgrading Medical Physics Services in the ARASIA Member States through Education and Training', the Agency has assisted in the establishment of a post-graduate educational course in Medical Physics at the University of Jordan, to address the lack of young medical physics specialists in the region. The Agency is also supporting the establishment of national clinical training programmes under project RAS/6/054, 'Upgrading Medical Physics Services in ARASIA State Parties through Education and Training (Phase II)'. Pilot clinical training programmes have been initiated in Jordan, Lebanon and Saudi Arabia.

110. Thyroid insufficiency is a major health problem in the women and children of Myanmar. The Government is trying to reduce the percentage of visible goitre in children from 33% to 20%. The Immunoassay Laboratory at the Nuclear Medicine Research Division of the Department of Medical Research has been receiving Agency assistance under MYA/6/024, 'Production of Monoclonal Antibodies and Reagents for Radioimmunoassay'. The project has helped extend the national capability of the monoclonal laboratory. Local production is more economical and more sustainable. Three laboratories in the Yangon General Hospital, the Mandalay General Hospital and the Central Women's Hospital (CWH) have benefitted from the project. The Yangon General Hospital provides diagnosis services to more than 3000 people with thyroid problems every year. The CWH provides service to pregnant women from endemic goitre areas, and also deals with cases of infertility.

111. Studies indicate that Sri Lankan adolescent girls are at risk of multiple micronutrient deficiencies and poor nutritional status. Under SRL/6/030, 'Improving Micronutrient Health Status of Adolescent Girls through Dietary Modification', the Agency has helped Sri Lanka to establish the national capability to assess body composition and micronutrient status, and to evaluate the efficacy of a newly developed nutrition and health education package. The Government of Sri Lanka has accorded the project national strategic status by incorporating it into the National Nutrition Policy and using its results in the ongoing education programme run by the Sri Lankan Ministry of Health.

C.3.3. Agricultural productivity and food security

112. Severe soil erosion and sedimentation problems occur in the Asia and the Pacific region due to improper land use and poor farming practices. Under RCA project RAS/5/043, 'Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Soil and Water Quality (RCA)', participating Member States developed the capability to conduct soil erosion measurements using nuclear techniques. Member States can now evaluate the effectiveness of different soil conservation measures, and better understand the link 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 a key factor in the project's success.

113. Only 1% of Mongolia's 1.56 million square kilometre land area is suitable for cultivation, and nearly 75% of wheat, 50% of vegetables and 20% of potatoes must be imported. Under MON/5/014, 'Application of Isotopes in Soil and Plant Studies', the Agency is building Mongolia's capacity to conduct studies on ways to increase crop production through expert advice, human resource capacity building and the provision of equipment and laboratory supplies. The project has successfully collected data on fertilizer use and biological nitrogen fixation by field crops. The Plant Science and Agricultural Research and Training Institute at Darkhan is now well equipped to carry out soil fertility analysis on samples from all over the country. The project has also enhanced water management abilities and built capacities in the use of stable isotope nitrogen-15 methodology to measure crop nutrient uptake. The Mongolian authorities have initiated follow up studies at the

national level to increase cultivated areas from 130 000 hectares to 350 000 hectares by 2010. The research team at Darkhan will measure fertility levels in these new cultivation areas.

114. In Bangladesh, the Insect Biotechnology Division of the Bangladesh Atomic Energy Commission (BAEC) developed protocols and optimized the irradiation dose for de-infestation as well as shelf-life extension of some fruits and vegetables through BGD/5/024, 'Phytosanitary Treatment for Insect Pests Infesting Fresh Fruits and Vegetables. A Bangladesh Standard Specification for Irradiated Food has been prepared and the Standard Specification for Irradiated Fresh Fruits and Vegetables is expected to be adopted in the near future. With Agency assistance, national capacity for the establishment of regulations and expertise has been consolidated. A network of people who have irradiation quarantine-treatment skills and experience of pilot studies and market trials of irradiated foods, has been established. The project helped Bangladesh to improve its capacity to export fresh fruits and vegetables, by satisfying legal aspects of the quarantine regulations of importing countries.

A farmer harvesting mung bean in Bangladesh.

115. Work continues on increasing agricultural productivity and enhancing food safety under RAS/5/052, 'Sharing Regional Knowledge on the Use of the sterile insect technique within Integrated Area-Wide Fruit Fly Pest Management'. A standardized approach provides guidance to Member States considering the integration of SIT in the management of their fruit fly pests, focusing mainly on training the plant protection staff involved in fruit fly suppression programmes, as well as on facilitating transboundary collaboration and overcoming phytosanitary constraints on the export of fruit and horticultural products. Under RAS/5/053, 'Assessing Feasibility for Area-Wide SIT-Based Control of the Mediterranean Fruit Fly in the Middle East', the experience gained by the successful control of the Mediterranean Fruit Fly using SIT in the Arava/Araba Valley of Israel and Jordan was sustained through strong regional cooperation among the national plant protection authorities of Israel, Jordan and the Territories under the jurisdiction of the Palestinian Authority. Steps have been taken to establish a regional SIT centre in Jordan under this project.

116. Efforts to control the spread and damage of the Old World Screwworm Flies in the Middle East continued throughout 2009. Two workshops were held (in Vienna and Muscat, Oman) under RAS/5/054, 'Contributing to the Assessment of the Feasibility of SIT-Based Area-Wide

Integrated Management of Old World Screwworm Flies in the Middle East', which aimed to build regional capacity in the assessment of the rate of OWS infestation and its prevention.

Improving animal health and promoting livestock production

117. Under MON/5/012, 'Monitoring of Residues in Livestock Products and Surveillance of Animal Diseases', the Agency helped Mongolia to establish capabilities in residue testing and disease sero-surveillance using nuclear and related techniques. The project was instrumental in the preparation and submission of a national dossier to the OIE, for international recognition of freedom from rinderpest. The dossier was accepted by the OIE General Assembly and Mongolia was declared free of rinderpest. The project also contributed towards the establishment of a national reference laboratory for veterinary residue monitoring and enhanced the sero-surveillance capabilities of the counterpart institute for major animal infectious diseases. The project has helped to improve food safety and animal health, facilitating Mongolia's participation in the international trade of animal derived food products.

118. With Agency support, Bangladesh has developed a self-sustaining Community-based Dairy Veterinary Service. Measurement of progesterone by radioimmunoassay (RIA) in milk samples collected at specific times in relation to artificial insemination, combined with the use of the computer database AIDA (Artificial Insemination Database Application), has proved to be a powerful tool for calculating reproductive indices and identifying factors which affect them. The Community-based Dairy Veterinary Service has created a self-financing foundation which, in collaboration with farmers' associations and the local dairy processor, will run the programme.

C.3.4. Water resource management

119. In Lebanon, LEB/8/004, 'Improvement of Groundwater Management and Protection through the Use of Isotopes and Nuclear Techniques', is helping to establish a laboratory that can use isotope techniques to study and manage water resources. National capacity has been developed through training and the establishment of a hydrology laboratory which is capable of carrying out various analyses, including tritium and C-14.

120. Under SRL/2/007, 'Identification of Trace Elements in Water and Biomedical Samples using High Sensitivity TXRF', Sri Lanka strengthened its nuclear analytical capability for the high sensitivity detection of trace elements/heavy metals in water/liquid and biomedical samples, through the use of total reflection X-ray fluorescence (TXRF). The establishment and utilization of the TXRF analytical facility has contributed to the identification of pollutants and sources of pollution, leading to improved drinking water quality. The recipient institution is also now able to identify trace elements in biomedical and forensic medical samples.

C.3.5. Environmental protection

Air pollution

121. With Agency support, RCA Member States have developed capabilities in the use of nuclear techniques to analyse air samples to determine the presence of pollutants. A database on the levels of key pollutants in the main urban and industrial areas in the region has been established using the data generated under the RCA projects, and close links have been established with the national authorities responsible for controlling air-pollution. These authorities have been provided with information generated through the RCA projects to facilitate their regulation of pollution sources. An example of resulting measures is the banning of vehicles with two-stroke engines in Bangladesh, after it was established they were key sources of air-borne particulate pollution.

Managing the marine environment

122. Under RAS/7/018, 'Upgrading Regional Capability to Assess Marine Contaminants in the ARASIA Member States', participating countries have developed national capabilities to monitor and assess marine radioactivity as part of their national monitoring programmes. Member States

have developed and adopted methodological guidelines that are strictly followed during marine radioactivity sampling and analysis, and are taking part regularly in proficiency tests.

123. Support in marine environment management is also being provided at the national level. Through TC project UAE/7/002, 'Environmental Monitoring Programme: Radioecology of the Coastal Environment', the United Arab Emirates has set up a gamma spectrometry laboratory to carry out a national environmental monitoring programme, focusing on radiology of the coastal environment. In Kuwait, the Agency has provided an integrated alpha spectrometry system and necessary accessories under KUW/2/004, 'Measurement and Assessment of Radionuclide Concentrations in the Coastal Marine Environment', strengthening national capacity in the assessment of concentrations of natural and man-made radionuclides in the coastal marine environment. TC project QAT/7/002, 'Establishing Infrastructure for the Radiological Monitoring of the Marine Environment', has helped Qatar to establish a national infrastructure capable of monitoring and assessing the levels, isotopic composition and dynamic behaviour of radionuclides in Qatar's marine environment.

C.3.6. Industrial applications

124. RAS/8/109, 'Supporting Radiation Processing of Polymeric Materials for Agricultural Applications and Environmental Remediation', is producing excellent results, with a number of countries completing production of super water absorbents, plant growth promoters and elicitors from oligosaccharides and grafted membranes for toxic metal absorbents. Pilot plant for continuous production of oligochitosan is now operational in Malaysia, and a pilot scale production of sericin extracted from silk cocoon is under development in Thailand. Field testing of oligosaccharides as plant growth promoters is being carried out in some countries (Malaysia, Vietnam, Thailand, India) and three countries (Malaysia, Pakistan and Thailand) have started work on radiation processing and utilization of polymer waste.

125. In Qatar, equipment was provided and expert missions were carried out to support the establishment of a laboratory for personal dosimetry, biological dosimetry and gamma spectrometry under project QAT/2/003, 'Establishment of a National Nuclear Analytical Laboratory'. A training course on quality assurance was also provided for the laboratory staff.

126. In Vietnam, improved tracer technology for the study of inter-well water movement has been introduced under VIE/8/019, 'Establishment of Tracer Technique to Study Processes in the Gas Industry'. The technology is being applied in the oil production industry to support the secondary recovery technique. This has greatly reduced water recycling costs, increased oil recovery and led to a better understanding of reservoir structure. The revenues from oil field tracer applications are some $1 million, a significant contribution to the funds of the Nuclear Research Institute in Dalat.

127. In Thailand, the existing Instrumental Neutron Activation Analysis (INAA) Laboratory was upgraded to a Radiochemical Neutron Activation Analysis Laboratory under THA/2/012, 'Strengthening of the Instrumental Neutron Activation Analysis Laboratory for Analysis of Food and Environmental Samples'. National analytical services for volatile elements speciation analysis in food and environmental samples, in accordance with international quality standards, have expanded.

128. Sri Lanka has developed and is currently producing hydrogel wound dressings for the medical sector, using natural and synthetic polymers, following the implementation of SRL/8/019, 'Technical Support for the Establishment and Operation of a Multi-Purpose Gamma Irradiation Facility'. A multi-purpose gamma irradiation facility, capable of sterilizing medical products, producing health care materials, and improving the quality and safety of food and other agricultural products, has been established.

Supporting heritage and archaeological findings

129. The Agency is assisting ARASIA Member States to develop and strengthen nuclear analytical capacities in the use of ion beam accelerators and associated nuclear analytical techniques. These techniques will allow ARASIA Member States to analyse archaeological objects, thus increasing knowledge of cultural heritage in the area. At the national level, the Agency is helping both Lebanon and Syria to strengthen their nuclear analytical capabilities by introducing microbeam lines to the existing accelerators. This upgrade will support precise micro-analytic capabilities.

130. The Agency has provided the United Arab Emirates (UAE) with support in X-ray fluorescence (XRF) for minimally invasive, high accuracy analysis of heritage and archaeological artefacts through UAE/0/006, 'Establishing an X ray Fluorescence Laboratory for Environmental and Archaeological Applications'. In 2009, an XRF laboratory was established in the University of Sharja. Three fellowships were carried out in Canada, and a two week scientific visit to USA was supported.

C.3.7. Energy planning and nuclear power

131. An increasing number of Member States in the Asia and the Pacific region are considering nuclear power as part of their energy mix strategy, for electricity and heat generation as well as for water desalination. In 2009, the Agency intensified efforts to provide more coordinated support to newcomer countries embarking on nuclear power programmes, and provided advisory assistance based on the Agency guidelines, 'Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)', including an overview of the comprehensive approach, workforce planning, advice and guidance to develop/update nuclear legislation and regulations. Integrated Nuclear Infrastructure Review missions were conducted in Jordan, Indonesia and Vietnam during 2009, and an Integrated Regulatory Review Service mission was carried out in Vietnam.

132. Under RAS/0/053, 'Providing Decision Support for Nuclear Power Planning and Development', comprehensive information on nuclear power was provided to Member States to support their decision-making in nuclear power planning and development. A regional seminar on 'Facts of Nuclear Power and Considerations to Launch a Nuclear Power Programme' was held in China for senior Government policy and decision makers from institutions responsible for or related to energy or nuclear power in Member States. A 'Public Information Seminar on Nuclear Power' was also held in Kuala Lumpur, attended by some 150 stakeholders from the regional and Malaysian national institutions. The Government of the Republic of Korea and the Korea Hydro & Nuclear Power Company (KHNP) hosted a two week event in June 2009 to mentor potential future leaders of nuclear power programmes in developing countries. KHNP provided experienced senior managers to act as full time mentors to participants. The event included visits to nuclear power plants, manufacturing facilities, construction sites, regulatory bodies and research institutes: all the industrial organizations and facilities needed for a nuclear power programme.

133. In China, support was provided to the expansion of the national nuclear programme through CPR/4/032, 'Enhancing the Capabilities of National Institutions Supporting Nuclear Power Development'. Eight centres/institutes received expert advice and human capacity building in a range of disciplines, ranging from nuclear power to nuclear safety, radioactive waste management and education in nuclear power engineering. Tangible results were achieved in 2009 that helped enhance recipient institution performance and increased their participation in the national nuclear power programme. The upgraded institutions will act as regional resource centres, providing training to engineers and technicians from other countries in the region interested in nuclear power.

134. The Agency provided support to Mongolia in their effort to restructure and organize uranium exploration, mining and marketing, by helping to build the required human and regulatory capacity, and to develop relevant

regulations to protect the environment, population and workers from the resulting mining by-products. With Agency support, Mongolia adopted a new general mining policy, a State uranium mining policy, and national legislation on uranium mining and milling as well as a strategic plan to restructure the sector and to build national capabilities. Under JOR/3/005, 'Launching Uranium Exploration', the Agency also provided support to Jordan to build capacity for the development of uranium mining.

C.3.8. Nuclear safety

135. Under the regional project RAS/0/056, 'Providing Legislative Assistance', the Agency is promoting a comprehensive national legal framework and helping to establish the necessary legal and regulatory infrastructure in Asian countries. In 2009, a training programme was organized for key representatives from seven Member States from the region with no nuclear legislation, with a view to provide an overview of the basic elements of nuclear law and the legal infrastructure governing the peaceful use of nuclear techniques. The training also provided an overview of the relevant international instruments governing safety, security, safeguards and liability for nuclear damage. Under the same project, Jordan's Nuclear Regulatory Commission was supported in re-drafting and finalizing Law No. 43 to develop regulations for radiation protection and nuclear safety and security.

Nuclear and radiation safety

136. Nuclear safety has been the focus of international cooperation between the Islamic Republic of Iran, Norway and a number of European regulatory authorities under IRA/9/018, 'Regulatory Infrastructure for Licensing and Control of Nuclear and Radiation Facilities in Iran'. In 2009, Norwegian extra-budgetary funds facilitated the implementation of phase one of the nuclear safety training programme for staff from the Iran National Regulatory Authority. The training programme, which primarily focuses on nuclear safety assessment and inspection activities, comprises three phases: class room instruction; on-site training at the facilities of the collaborating Regulatory Authorities in Europe; and a mentoring phase whereby the knowledge and experience acquired is integrated into the daily functions of the trained staff. The programme supports the commissioning and operation of the country's first nuclear power plant at Bushehr.

137. TC project QAT/9/003, 'Establishing an Early Warning Network for Nuclear Accidents and Radiological Emergencies', has helped Qatar to establish an early warning system for radiation emergencies and a network to continuously monitor the level of gamma radiation over Qatar. The system has been evaluated, and is operating effectively.

Upgrading radiation protection infrastructure

138. A coordination meeting in Amman under regional project RAS/9/054, 'Strengthening National Regulatory Infrastructures', reviewed progress and brainstormed about future activities to enhance radiation safety in the participating countries. Regional training courses in cardiology and electrophysiology and in hybrid imaging (PET/CT, single photon emission computed tomography/CT) continued in 2009 under project RAS/9/055, 'Strengthening Radiation Protection in Medicine', with support from the Philippines and Singapore. Project RAS/9/056, 'Strengthening Capabilities for Protection of the Public and the Environment from Radiation Practices', provided advice to help Lebanon engineer sustainable solutions to the environmental problems posed by the Selaata phosphate plant, and Pakistan has been supported in its establishment of environmental surveillance laboratories.

Assistance in radiation protection and radiation safety is provided to Member States through dedicated regional projects dealing with 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.

Radioactive waste management

139. In 2009, under regional project RAS/3/009, 'Strengthening Infrastructure for Radioactive Waste Management', Vietnam was helped to identify disused radioactive radium sources in several locations, and to manage them safely. The sources were transported to a centralized storage facility and conditioned in accordance with IAEA protocols by the South African Specialized Team, which has performed similar tasks in many African countries. The team also trained a local team to maintain the storage facility and to handle and condition radioactive radium sources.

140. In Iran, under IRA/4/034, 'Characterization of Candidate Sites for Low- and Intermediate-level Radioactive Waste Repository', the Agency built capacities in the counterpart institute in the formulation and application of site selection criteria, and the collection and analysis of relevant data for the safety assessment of potential sites for a waste repository. As a result of the training and equipment provided, site investigation was performed at two locations and a conceptual design and safety assessment was completed.

C.3.9. Nuclear security

141. Under RAS/9/060, 'Developing Human Resources in Nuclear Security', the Agency assists Member States in the region in their efforts to develop sustainable human resources able to improve their nuclear security infrastructures. The assistance provided focuses on the provision of human capacity building measures such as fellowships, regional training, technical visits, on-the-job training and the implementation of international legal instruments. This project is funded through the Nuclear Security Fund and is addressed to train law enforcement agencies (police, customs, and civil protection) and the radiation safety regulatory authorities from all Member States in this region.

142. In 2009, 75 participants from 20 Member States in the Asia and the Pacific region were trained on combating illicit trafficking in nuclear and other radioactive materials, physical protection of nuclear research reactors, and on nuclear security culture. The training was provided through a workshop and two training courses in Malaysia, Australia and China respectively.

C.4. Europe

C.4.1. Europe region at a glance

143. In 2009, the TC programme provided support to 32 countries in Europe. Net new obligations reached $30.7 million, and the financial implementation rate was 84.0%. The distribution of disbursements in the region for 2009 by area of activity is shown in Figure 8.

144. Throughout 2009, activities in the Europe region focused health, nuclear power planning and development, industrial applications of radiation, safety and security, and radioactive waste management and decommissioning. Special emphasis was given to improving health care through improved nuclear medicine for the diagnosis of various diseases and through cancer treatment. The planning and development of new power plants was also stressed, as was the strengthening of safety regulatory infrastructure, self assessment, and operational safety for nuclear power plants. Other key areas were radioactive waste management; and protecting the environment.

- Disbursements for the TC programme in Europe **$24.5 million**
- Net new obligations in Europe for 2009 **$30.7 million**
- Implementation rate for the programme **84.0%**
- Number of countries receiving support **32**
- **1109** expert and lecturer assignments, **2283** meeting participants and other project personnel
- **550** participants in training courses, **256** fellows and scientific visitors

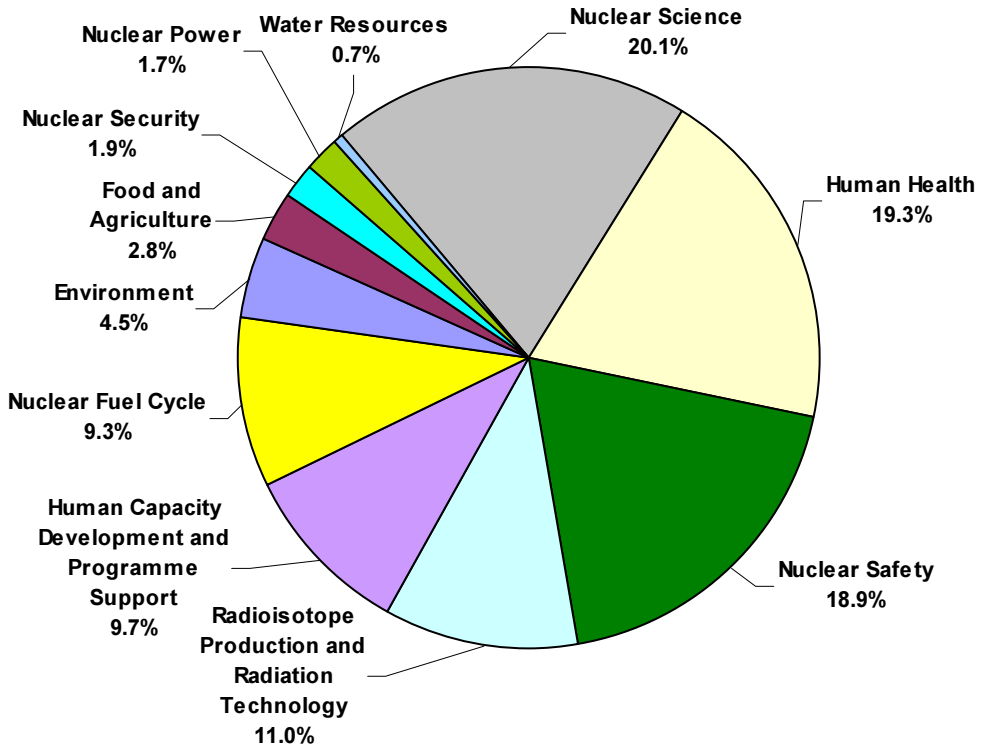

Figure 8: Disbursements by Technical Field for 2009 – Europe.

C.4.2. Human health

145. In Kazakhstan, TC supported a major government programme to create three new nuclear medicine centres in Almaty, Astana and Semipalatinsk under KAZ/6/007, 'Establishment of a Nuclear Medicine and Biophysics Centre', which focused on human resource capacity building. The project started in 2005, working with the Nuclear Medicine and Biophysics Centre but establishing synergies with the Semipalatinsk Regional Oncology Centre (SROC). In 2009, 22 people had completed training through a programme of fellowships and scientific visits in Estonia, Czech Republic, Germany, Netherlands, Republic of Korea, Turkey, Russia, Switzerland and United Kingdom. Together with the expert services provided, the training covers the whole spectrum of activities that will be handled by the Nuclear Medicine and Biophysics Centre. The project also supplied geltech generator assemblies to support the production of technetium generators at the Institute of Nuclear Physics (INP). Once fully established, the Nuclear Medicine and Biophysics Centre will be a single comprehensive facility for radiopharmaceutical production (covering national needs), biophysical tests and NM studies and treatment of patients.

146. In Tajikistan, in 2009, the Agency completed a major project that supported the rehabilitation of the national healthcare system. Under TAD/6/002, 'Upgrading Nuclear Medicine Services', the Centre for Radionuclide Diagnosis and Treatment, a functional nuclear medicine service, was set up in the Institute of Gastroenterology. The Centre provides services for the early and effective diagnosis of thyroid, cardio, bone, liver, kidney, gastrointestinal diseases and other medical conditions. The project, which continued over three TC cycles since 2003, established a radioimmunoassay (RIA) laboratory, introduced NM imaging procedures and implemented quality assurance/control guidelines. With nine trained staff and modern equipment, the Centre can now provide RIA studies for 4 400 patients, and in vivo studies for 3 420 patients each year. The resumption of nuclear medicine services has contributed positively to the national healthcare system and has reduced the need to seek NM services abroad.

147. A national quality assurance programme in radiotherapy has been established in Poland through project POL/6/008 'Establishment of a National Quality Assurance Programme in Radiotherapy in Poland'. Two Quality Assurance Team for Radiation Oncology (QUATRO) missions were conducted in Gdansk and Krakow in 2009, and as a result, the two institutions reviewed have been recognized as centres of competence in radiotherapy.

C.4.3. Agricultural productivity and food security

148. Regional project RER/5/014, 'Suppressing the Mediterranean Fruit Fly by Integrating the Sterile Insect Technique on an Area-Wide Basis in Neretva Valley', aims to minimize the fruit production damage caused by the fly and to help reduce the use of insecticides. The fly lays its eggs in fruit and vegetables, and is one of the world's most destructive insect pests. The project is carried out in partnership with the Food and Agriculture Organization of the United Nations (FAO). So far, technical and economic feasibility studies have been carried out for both Croatia and Bosnia and Herzegovina, and baseline data have been collected for Croatia. Montenegro has asked to participate in the project.

C.4.4. Environmental protection

149. Under MNE/8/002, 'Upgrading a Persistent Organic Pollutant Laboratory towards Accreditation for Environmental Monitoring', a fully equipped laboratory has been established at the Centre for Ecotoxicological Research of Montenegro (CETI). The laboratory has the capacity to analyze and trace persistent organic pollutants (POPs), particularly dioxins and dioxin-like polychlorinated biphenyls. The capabilities of the new laboratory are in line with the requirements set down in the European Directives, as well as with those of the US Environmental Protection Agency. The work carried out under the project was instrumental in building the national register of POPs of the

Montenegrin National Implementation Plan, required as a pre-condition to become a contracting party of the Stockholm Convention on POPs. The work will also help the Montenegrin national authorities to enact technically informed regulations and to establish national environmental policies that are fully consistent with the requirements of EU legislation.

Environmental contamination by POPs has been identified at the Aluminium Plant in Podgorica, Montenegro.

C.4.5. Industrial applications

150. Under regional project RER/8/015, 'Using Nuclear Techniques for the Characterization and Preservation of Cultural Heritage Artefacts in the European Region', the Agency is providing logistical support for the application of nuclear techniques for the preservation of cultural heritage artifacts through networking and technology promotion, which are essential for promoting and developing cultural heritage treatment. In 2009, 18 Member States participated in a regional workshop on the protection of cultural heritage artefacts.

151. Regional project RER/8/014, 'Supporting Radiation Synthesis and the Characterization of Nanomaterials for Health Care, Environmental Protection and Clean Energy Applications', strengthens international cooperation among participating Member States in the use of electron accelerators and gamma sources for nanomaterial synthesis and processing. Member States are collaborating in several ways, taking advantage of the wide variety of equipment and knowledge available in various institutions that has became available to all participants under this project. A regional training course provided 19 participants with basic theoretical and practical understanding of topics related to radiation synthesis and characterization of new functional materials on the nanoscale.

C.4.6. Energy planning and nuclear power

152. A Workshop on Economics and Financing of Nuclear Power, a Regional Workshop on Project Management (focusing on nuclear power infrastructure building) and a Workshop on Workforce Planning for Introduction of Nuclear Energy took place in 2009 under RER/0/029, 'Support for Introduction of Nuclear Energy (Phase 2)'. This project supports activities of common interest to 12 countries that are considering independent introduction of nuclear power for the first time, and supports seven observer countries that already operate their own NPPs and are planning new plants.

153. Under RER/4/030, 'Strengthening Capabilities for Nuclear Power Plant

Performance and Service Life including Engineering Aspects (Phase II)', the Agency is supporting the updating and development of a unified procedure for lifetime assessment of components and piping of WWER plants: the VERLIFE code. This code will be used for European WWER operating countries – Bulgaria, Czech Republic, Finland, Hungary and Slovakia – to ensure the safe and reliable operation of nuclear power plants in the region throughout their design lifetime and to better prepare for possible lifetime extensions through improved understanding of engineering issues concerning integrity, ageing mechanisms, degradation control and mitigation, and replacement.

154. In Turkey, under TUR/3/009 'Upgrading the Infrastructure for Fabrication, Characterization and Irradiation Testing of Uranium- and Thorium-Based Oxide Fuels', the capacity of the fuel research laboratory at the Çekmece Nuclear Research and Training Centre (ÇNAEM) in Istanbul was upgraded with the supply and commissioning of equipment needed in the manufacture of fuel rods for research purposes. Completion of this operation in 2009 has improved CNAEM's capabilities to support a planned nuclear power programme.

155. In Belarus, BYE/0/006, 'Developing Human Resources and a Training System for the Nuclear Power Programme', was started in 2009 in support of a planned nuclear power programme. Even only one third into the project, a clear improvement in the development of HR for the nuclear power programme can be detected. A plan has been developed for workforce planning, an HR strategy has been developed, and technical specifications for a training centre were established.

C.4.7. Nuclear safety

Enhancing radiation and nuclear safety regulatory infrastructure

156. Although some Member States in the TC Europe region have already set up regulatory infrastructures that are comparable to western European countries operating nuclear power plants, others are still in the process of setting up a framework fully in line with IAEA safety standards and international recommendations. As a result, requests for cooperation to reinforce one or several of the constituents of the Thematic Safety Area 1 (TSA 1) continue to be very high in the region.

157. To help Member States to identify gaps or weaknesses in their radiation safety regulatory infrastructures in a systematic and comprehensive way, intensive hands-on training is being delivered on the use of IAEA tools specially developed for this purpose. Participants from 23 Member States have started training on the fundamentals and operation of the Self-Assessment Methodology and Tool and the Radiation Safety Information Management System (RASIMS). Support was also provided, on request, to put the newest version of the Regulatory Authority Information System (RAIS) into operation.

158. Several workshops were held in 2009 within the frame of project RER/9/099, 'Strengthening the Effectiveness of Regulatory Authorities and Advanced Training in Nuclear Safety', which facilitates cooperation among the regulatory authorities of countries operating nuclear installations, to discuss how to measure and improve performance. Stakeholder participation in the regulatory process is a topic of growing interest to regulatory authorities. A pilot workshop was organized in 2009 in Romania, to examine areas of cooperation among project counterparts for the exchange of experiences and lessons learned regarding reinforcing communication and encouraging public participation in the daily work of the regulatory authorities, with particular attention to media and non-governmental organizations.

Improving Safety Management

159. TC project RER/9/098, 'Improving Safety Management Systems and Operation Feedback', is mainly intended to foster cooperation among Member States to facilitate the introduction of the new safety standards GS-R-3, *Management System for Facilities and Activities*, and the companion Safety Guide GS-G-3.1, *Application of the Management System for Facilities and Activities*. In 2009 a joint IAEA-European

Atomic Forum workshop was organized under the project to discuss obstacles in implementing the requirements of GS-R-3. The discussion showed clearly that there is still much to do before regulators and operators will be ready to fully adjust to the new standards. The IAEA's technical cooperation programme, in partnership with other organizations, was identified as a suitable mechanism to establish a platform to exchange experiences and foster common understanding to pave the way for a wide introduction of GS-R-3. Other activities have also been organized within the frame of the project to share information about methods and approaches used to maintain oversight of the safety culture in nuclear facilities.

The IAEA's Safety Requirements GS-R-3, *Management System for Facilities and Activities*, and the companion Safety Guide GS-G-3.1, *Application of the Management System for Facilities and Activities*, set state of the art standards for improving safety performance of the organization directly responsible for operating facilities and activities through the planning, control and supervision of safety related activities in normal, transient and emergency situations. These standards are also intended to foster a strong safety culture in individuals and teams. The inherent complexity and large scale implications associated with the implementation of these safety standards call for a sustained effort to speed up their adoption by the regulatory authorities of Member States.

Radioactive waste management and decommissioning

160. In the Europe region, the TC mechanism continues to help Member States to move forward with their decommissioning plans for nuclear facilities, in particular through RER/3/009, 'Supporting Planning for the Decommissioning of Nuclear Power Plants and Research Reactors (Phase II)' which is organized in the International Decommissioning Network (IDN). In 2009, responding to demand for more specialized training sessions aiming at developing skills that would be required in decommissioning or in complex planning topics such as costing, the network offered a group scientific visit to the UK for participants from seven Member States to see characterization, decontamination, cutting of steel and concrete structures, waste segregation and processing at several reactors and other fuel cycle facilities at Dounreay and Sellafield. In addition, a specialised training course on the decommissioning of small nuclear facilities was held in the U.S. for 12 Member States.

161. Many countries in the Europe region used to collect and store radioactive waste at centralised facilities without appropriate proper treatment and conditioning. Support to operators focusing on improving their waste management practices and providing appropriate solutions suitable for participating countries across Europe was provided under RER/3/007, 'Improving Quality Management of Radioactive Waste'. An exchange of waste handling experience and quality management principles for predisposal activities through specialist workshops facilitated transfer of modern technologies, in particular bituminization, cementation, vitrification and plasma incineration.

162. The second unit of Ignalina NPP in Lithuania shut down in December 2009 in line with commitments made to the European Union. The NPP had provided about 70% of Lithuania's electricity and was an important energy provider in the region. Activities under LIT/3/003, 'Establishing a Comprehensive Programme for Management of Radioactive Waste including Decommissioning Waste of Existing and New NPP', focused on management of radioactive waste, including decommissioning waste and enhancing national capabilities in the licensing of a new NPP.

Safety of research reactors

163. The Eurasian Research Reactor Coalition was set up in 2008 with Agency support in order to promote increased and effective utilization of research reactors for scientific and socio-economic development, centred on Central Asian reactors in Kazakhstan and Uzbekistan and including reactors in the Czech Republic and Ukraine.

Fuel repatriation

164. Regional project RER/3/006, 'Supporting the Repatriation, Management and Disposal of Fresh and/or Spent Nuclear Fuel from Research Reactors', assists Member States with research reactors to repatriate, manage or dispose of their fresh or irradiated nuclear fuel and to convert research reactor cores from HEU to LEU so as to free all irradiated HEU for repatriation. In 2009, fresh HEU was repatriated under this project from Hungary to Russia, and assistance was provided to the development of a $25 million Foreign Trade Contract between Serbia and Russia which provides the legal base for repatriation of spent HEU and LEU nuclear fuel from the Vinca Institute in Belgrade to the Russian Federation as the country of origin

165. TC project SRB/4/002, 'Safe Removal of Spent Fuel of the Vinca RA Research Reactor', is the largest national project in TC history, with a total cost of more than US $ 50 million. Roughly half of the funding is being provided by the Serbian government; most of the remaining funding is provided by international donors. In 2009, the Public Company Nuclear Facilities of Serbia, which is the local operator of the Vinca spent fuel repatriation project, achieved another major milestone by initiating repackaging operations for 8030 spent fuel elements. This activity is projected to be completed in mid-2010. To support this work, a custom Water Chemistry Control System (WCCS) was installed at the Vinca RA research reactor. The system, designed as an in-kind contribution from the United States Department of Energy and fabricated in Slovakia, helped to reduce radiation exposures in the working zones for spent nuclear fuel repackaging by a factor of 4.5, and has been instrumental in clearing the path for licensing of spent nuclear fuel repackaging and repatriation.

C.4.8. Nuclear security

166. Under project RER/9/102, 'Developing Human Resources in Nuclear Security', the Agency assists regional efforts to develop sustainable human resources to improve nuclear security infrastructures. Assistance focuses on the provision of human capacity building measures such as regional workshops and training courses. This project is funded through the Nuclear Security Fund and trains law enforcement agencies (police, customs, and civil protection) and radiation safety regulatory authorities from all Member States in the European region.

167. In 2009, two workshops and two regional training courses were organized covering the area of physical protection of nuclear material and facilities, physical protection inspections at nuclear facilities and combating illicit trafficking in nuclear and other radioactive material. More than 75 participants from Member States from the European region were trained in 2009.

C.5. Latin America and the Caribbean

C.5.1. Latin America region at a glance

168. In 2009, the TC programme provided support to 22 countries in Latin America. Net new obligations reached $17.2 million, and the financial implementation rate was 73.6%. The distribution of disbursements in the region for 2009 by area of activity is shown in Figure 9.

169. With regard to the regional programme, the number of projects and the resources assigned to food and agriculture increased considerably in 2009, not only in absolute terms but also in comparison to previous cycles, and now constitute the largest single component of the regional programme in the current cycle. Human health also remains one of the most active areas and support to building regional capacity in terms of human resources and laboratory infrastructure has grown steadily.

- Disbursements for the TC programme in Latin America **$14.9 million**
- Net new obligations in Latin America for 2009 **$17.2 million**
- Implementation rate for the programme **73.6%**
- Number of countries receiving support **22**
- **763** expert and lecturer assignments, **946** meeting participants and other project personnel
- **485** participants in training courses, **290** fellows and scientific visitors

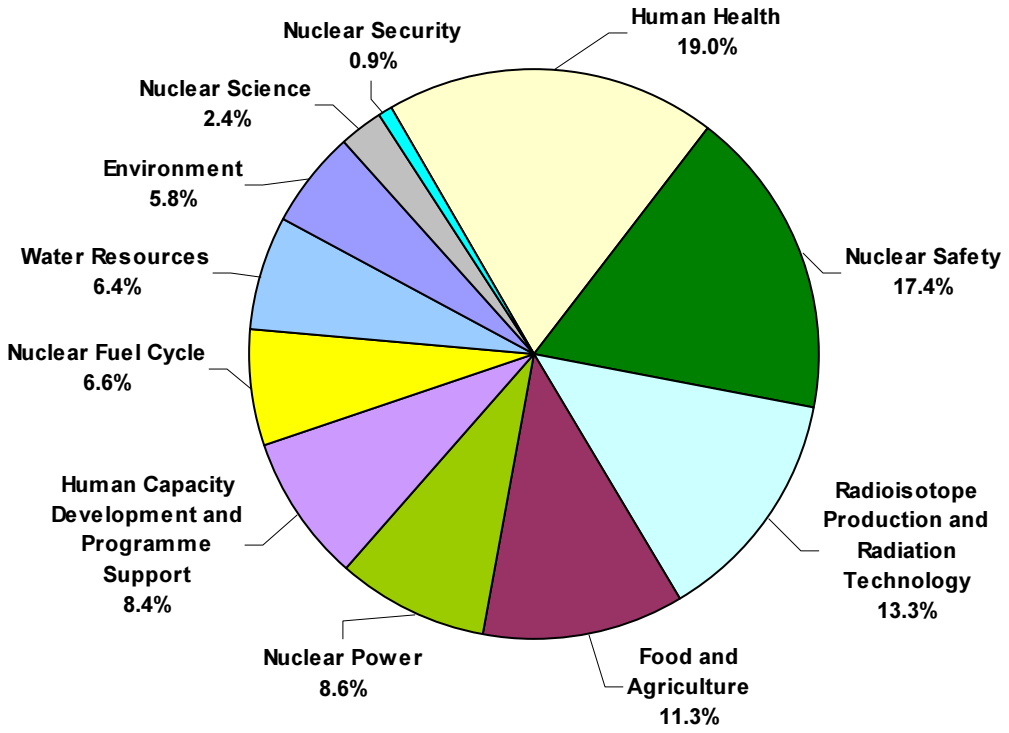

Figure 9: Disbursements by Technical Field for 2009 – Latin America.

C.5.2. Human health

170. Obesity and under nutrition represent a double burden for most of Latin American and the Caribbean countries. A five-year capacity-building project to improve nutritional status, RLA/6/059, 'Implementation and Evaluation of Intervention Programmes to Prevent and Control Childhood Obesity in Latin America (ARCAL XCI)', was completed in 2009. The project focused on 4 to 9 year old children, as nutritional habits and physical activity levels are established around these ages. The project produced educational materials promoting healthy lifestyles in children, and collected data on the prevalence of overweight and obesity in urban schools to use as a baseline for intervention programmes. State of the-art body composition measurements using deuterated water were completed by 10 of 12 countries and are being used to validate simpler measurements involving anthropometric or bio-impedance measurements within the local populations.

171. TC project GUA/6/016, 'Reference Laboratory for Research in Chronic, Nutrition-Related Diseases in Guatemala and Central America', supported the development of a reference laboratory for diagnosis, evaluation and control of nutrition-related chronic diseases in Guatemala and all Mesoamerica. Equipment was provided for assessing body composition and for blood analyses to determine risk of chronic disease, and the training of personnel was sponsored. The laboratory has improved national capacity to conduct studies in support of national efforts to prevent and reduce nutrition-related chronic diseases.

C.5.3. Agricultural productivity and food security

172. In Mexico, an outbreak of cactus moth – a pest which poses a serious threat to large ecosystems based on *Opuntia* cacti, as well as the cultivation of this crop – has been eradicated through the combined efforts of Mexico's Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), the Agricultural Research Service of the US Department of Agriculture (USDA-ARS), and TC project MEX/5/029, 'National Prevention Campaign against the Cactus Moth'. *Opuntia*

Collecting data for RLA/6/059.

cacti are of great economic, environmental and cultural importance in Mexico, with hundreds of thousands of hectares in cultivation and over 3 million hectares covered with wild *Opuntia* as the dominant component of the natural flora. Through the project, the area of the outbreak was

defined, and measures were implemented for the suppression of the pest, which mainly consisted of host removal and application of the sterile insect technique. In February 2009, once a period of three biological cycles of the pest without detection was completed, the moth was declared eradicated. Through the project, Mexico has established a comprehensive surveillance programme capable of the early detection and eradication of any future outbreak.

173. Belize is the only country in Central America still free of the Mediterranean fruit fly. Nevertheless, it has not been able to expand its export markets of orange and grape-fruit juice and pulp due to the presence of an endemic pest called Mexican fruit fly. In 2007, BZE/5/002, **'**Establishment of a Pilot Fruit Fly Free Area Using an Integrated Approach that includes the Area Wide Sterile Insect Technique**',** was initiated to suppress populations of the established Mexican fruit fly. The project was strongly supported by the Belize citrus industry. The project was successfully implemented in a pilot area in the Stan Creek valley, the main region for commercial citrus production. As a result, the Belizean citrus industry selected the project's pilot area as the prime source for processing grapefruit and orange pulp to export to international markets, and adopted the pest population surveillance and control technology transferred through the project as the basic tool for qualifying potential areas for citrus juice and pulp processing. This decision will benefit over 40,000 hectares of citrus, supporting around one thousand farmers and workers families. In addition, the amount of pesticides used to control the pest can be reduced by up to 50%.

174. In Guatemala, restrictions on the international export of tropical and semi-tropical fruits and vegetables due to the presence of several species of fruit flies have been successfully addressed through GUA/5/016, 'Establishment of Fruit Fly Free or Low Prevalence Areas using the Sterile insect technique' with strong support from the private sector, particularly the producers and exporters of fruit and vegetables. As a result, Guatemala has become the most important exporter in the Central America region of fresh tomatoes, peppers and papayas to the USA, the nearest international market to Central America. Annual exports of these commodities amounts over $4 million.

175. Peru has little agricultural land and the production of basic food is deficient. It is thus very important to expand agriculture to marginal lands and to identify crops that can be planted in such environments. Quinoa and kiwicha are highly valuable crops due to their nutritional balance, amino acids and agronomic resilience.

Forty tonnes of oranges ready for processing in Belize.

PER/5/030, 'Genetic Improvement of Quinoa and Kiwicha using Mutation Induction and Biotechnology' aimed to improve national capacity to increase the yields and market

competitiveness of these crops. As a result of the project, farmers, NGOs and marketing companies received seeds of the new mutant varieties of cereals. In the case of the kiwicha centenario variety, productivity has increased from 1500 to 5000 kilograms per hectare and in price from 0.50 soles to 1.20 soles per kilogram, quite aside from an increase in nutritional value in relation to Omega 3 and 6 content. The Cereals Programme of the University has also made baked products with an increased nutritive value available to the market.

176. A number of regional and national projects are addressing pesticide contamination in Latin America. Among these are RLA/5/053, 'Implementing a Diagnosis System to Assess the Impact of Pesticide Contamination in Food and Environmental Compartments at a Catchment Scale in the Latin American and Caribbean Region (ARCAL CII), which applies a diagnosis and assessment system for evaluating the impact of pesticide contamination in food and environmental compartments in the river basins in the region, COS/5/026, 'Management and Appropriate Use of Insecticide-nematicides', in Costa Rica, which addresses the adverse impact of insecticide-nematicides through the application of water management and nuclear techniques, PAN/5/017, 'Monitoring Pesticide Residues in the Production of Tropical Fruit (Pineapples and Melons) and Controlling Analytical Quality with the Aid of Nuclear Techniques', which improves food safety in the production of tropical fruits in Panama, and URU/5/025, 'Determining Pesticide and Antibiotic Residues in Food for Local and Export Consumption', which improves capabilities to determine pesticide residues in fresh fruit and vegetables.

177. In Nicaragua, NIC/5/007, 'Determining Drug Residues in Bovine Meat Exports' has strengthened the technical capacities of the National Residues Laboratory of the Ministry of Agriculture and Forestry to determine and monitor residues of veterinary medicine (antibacterial substances and growth promoters) in meat for sale to other markets. Human resources were strengthened through on-site training in chromatography and laboratory quality assurance protocols according to the ISO 17025 standard and by fellowship training in radio-assay, immunoassay and chromatographic analytical techniques. Laboratory equipment was also provided. As a result of the project, new analysis techniques have been introduced, services have been extended to other export items and progress has been made towards achieving the residue plans for such items as peanuts (export volumes of up to 72 000 metric tons), shrimp (10 000 metric tons) and honey (up to 300 metric tons), bringing up to US $160 million into the country. Meat export has also been strengthened (60 000 metric tons) thanks to the introduction of the new techniques, helping bring up to US $200 million into the country (US $360 million in total).

178. Under RLA/5/049, 'Integrated Control of Fascioliasis in Latin America (in Support of National Programmes)', Argentina, Bolivia, Cuba, Mexico, Panama, Peru and Uruguay have come together to develop Fascioliasis control strategies that incorporate the latest knowledge tailored and adapted to specific national requirements. The project aimed to improve national diagnostic capabilities. With more accurate data on the occurrence of Fasciola, appropriate control strategies in each country could be better formulated. Participating countries have acquired essential data on the epidemiology of the disease, and understanding of the prevalence and incidence of the disease in animals and humans has increased.

C.5.4. Water resource management

179. Throughout 2009, efforts to increase Member States capacities in the analysis of stable isotopes of hydrogen and oxygen for hydrological studies continued, generally in the framework of water resource assessment and management. The Agency has provided recently-developed laser spectroscopy isotope analyzers within several national projects. This new technology gives counterparts easier and faster access to isotope results, avoids delays due to shipment to external laboratories and positively affects the timing and the implementation of studies and projects, as well as lowering analytical costs.

180. In El Salvador, the Agency is helping to ensure the long-term availability of groundwater resources under ELS/8/008, 'Sustainability of the Rural and Metropolitan Groundwater Aquifers'. Using isotope hydrology techniques, the processes and mechanisms of groundwater recharge and the hydraulic interconnections between aquifer layers in two aquifers in the central part of El Salvador have been investigated. As a result of the project, capabilities in the water sector to define recharge areas, age of water and preferential directions of groundwater flow in the aquifers have been enhanced. Specific project outcomes include hydrogeological maps that show areas of groundwater recharge within the Rio Sucio basin, and a conceptual hydrological model of the San Simon aquifer, indicating the recharge areas of the geothermal system and their possible interconnections with the overlaying, younger groundwater.

181. In Mexico, the Agency is providing support to the Geophysics Institute of the National Autonomous University of Mexico with isotopic and hydrogeochemical characterization of drinking water wells supplying the León Valley, Guanajuato (project MEX/8/026), focusing on expanding knowledge of the valley's aquifer system and strengthening the hydrodynamic functioning model proposed for the valley. The isotopic results obtained through this project have been integrated in other similar studies of neighbouring basins, all located in the Trans Mexican Volcanic Belt which, with an extent of approximately 920 km2, cuts through the central part of the Republic of Mexico from the Pacific Ocean to the Gulf of Mexico, passing through 13 states. The project has technical and economic support from local authorities in that Mexico is directly financing most of the project. As part of the project, a stable isotope laboratory has been strengthened which, owing to its experience and quality, forms part of the network of laboratories providing analytical and consultancy services to other Latin American countries.

C.5.5. Environmental protection

182. Under RLA/7/012, 'Use of Nuclear Techniques to Address the Management Problems of Coastal Zones in the Caribbean Region', regional capacities have been improved for the use of nuclear techniques to reconstruct the history of pollution in coastal ecosystems. Over 70 counterparts from twelve participating Member States have been trained on various aspects of coastal zone investigations. The project, implemented in cooperation with United Nations Environment Programme-Caribbean Regional Co-ordinating Unit, supports the aims of the Latin America and Caribbean Initiative for Sustainable Development created in 2002, and the Panama Declaration signed by the Heads of State of the Association of Caribbean States (ACS) in 2005.

183. As a result of CHI/7/011, 'Development of Nuclear Technologies and Information Technologies for an Early Warning Environmental Observatory Centre for Red Tide', a consolidated toxin monitoring programme based on radioassay is now implemented in an operational laboratory in Castro and in an authorized and ISO certified laboratory in Santiago. This has given the Chilean national monitoring programme on marine biotoxins in seafood the ability to measure low levels of paralytic shellfish poisoning (PSP) toxins with a high throughput, and increases the potential for early warnings on marine biotoxin levels. Fatal cases due to the consumption of PSP intoxicated seafood products have been reduced, and more precise decisions on areas of shellfish aquaculture that should be closed are now possible. In addition, the risk-based sanitary decision making process for seafood export and for the national market is operational.

184. A similar project, ELS/7/002, 'Detection of Marine Toxins through the Use of the Radioassay Method in El Salvador', aimed to reduce the risk of intoxication through the ingestion of contaminated food by means of an appropriate monitoring and emergency system. The project has led to the establishment of a marine toxin laboratory in the University of El Salvador, the first in Central America. The laboratory is equipped for monitoring of red tides in El Salvador, and can provide timely information to permit decision-making with the

involvement of the public and the institutions concerned. The laboratory can detect toxins with a shorter response time and can process a larger number of samples. The project directly benefits 20 000 artisan fishermen on a coastline of 366 km that generates an annual fishing volume of 30 860 tonnes with a commercial value of $60.9 million.

C.5.6. Industrial applications

185. The ARCAL project RLA/8/043, 'Use of Nuclear Analysis Techniques and Development of Databases for Characterization and Preservation of National Cultural Heritage Objects', has contributed to the study and preservation of national cultural heritage by providing analytical information for the characterization and contextualization of cultural heritage artefacts, through the collaborative use of available facilities in the region. The classification, preservation and restoration of historical objects require scientific, technical and historical knowledge. The creation of databases which document historical artefacts through cross-references, documentation and design data is thus of great importance. The chemical composition of the goods plays a fundamental role in establishing their profiles: for this purpose, nuclear analytical techniques are especially useful. During the project 1787 samples (mainly ceramics) were analyzed. A key project achievement was the sharing of experience and techniques and the joint effort to create and maintain a regional database. For the first time, isolated efforts were combined in a common endeavour.

186. ARCAL project RLA/8/042, 'Application of Nuclear Technology for the Optimization of Industrial Processes and for Environmental Protection' has contributed to the optimization of industrial processes and environmental protection in Member States, using radioisotope technology. Following training and the provision of equipment, radiotracer and sealed source techniques have been applied in chemical plants, mineral industry, and wastewater treatment plants, among others.

187. In Cuba, the quality of care for burn patients has been improved through treatment with locally produced hydrogel membranes. The Agency provided expert advice, specialized training and a new laboratory irradiator through CUB/8/023, 'Obtaining Hydrogel Membranes for Biomedical Applications with the Aid of Gamma Radiation'. As a result of the project, hydrogel membranes were produced and validated on a pilot basis. In addition, when an existing irradiator stopped working in the middle of the project, the counterparts establishing a cooperation agreement with the Venezuelan Institute of Scientific Research for use of their commercial irradiator, resulting in a bilateral cooperation between the two countries. Once the hydrogel membranes have been approved for use by the National Health System, a planned larger scale production will be able to support the treatment of some 800 burn patients per year, reducing the healing time of wounds by 20%.

C.5.7. Energy planning and nuclear power

188. Regional project RLA/4/021, 'Environmentally Assisted Cracking and Structural Integrity of Components in Light Water Reactors' aims to ensure the safe and reliable operation of nuclear power plants in the region and to prepare for possible lifetime extensions. Participating countries exchange best practices in service life management in order to develop regional mechanisms for improving nuclear power plant performance and safety in Argentina, Brazil, and Mexico. Group activities were organized in collaboration with utilities from Atucha 1 and 2, Embalse NPP, Argentina and Angra I and II NPP, Brazil, and Laguna Verde 1 and 2 NPP, Mexico.

C.5.8. Nuclear safety

189. Emergency preparedness systems in Latin America countries were not harmonized, and were not fully consistent with Agency requirements. Under RLA/9/061, Strengthening National Systems for Preparedness and Response to Nuclear and Radiological Emergencies (TSA5)', the Agency offers an integrated all-hazards approach in compliance with IAEA requirements (IAEA Safety Standards Series GS-

R-2). Two regional events and a number of national courses were organized, and basic instrumentation and publications were provided to some countries in the region, as well as training in the form of fellowships and scientific visits. Countries in the region also considered it important to harmonize the activities of the biological dosimetry laboratories under the umbrella of the Latin American Biological Dosimetry Network (LBDNET), also established under the TC project. An important LBDNET activity was the harmonisation of laboratory procedures on the basis of ISO standard No. 19238 (2004) in order to reach a unified level of mutual assistance in case such assistance has to be provided under the Assistance Convention. A better understanding of international standards now exists in the region and participating countries have tools to improve their national systems.

190. TC regional projects RLA/9/064 and RLA/9/053, 'Strengthening National Regulatory Infrastructures for the Control of Radiation Sources (TSA1)', aim to improve the operational national regulatory infrastructure for the control of radiation sources to ensure the protection of people and the environment from the adverse effects of ionizing radiation. The projects addressed deficiencies in legislation, regulations and guidance, authorization and inspection at the national level. The projects were carried out in partnership with the Spanish Nuclear Security Council and the US Nuclear Regulatory Commission. Progress has been made in the participating countries, including, inter alia, approval of a Law on Radiation Safety by the Parliament in Honduras, establishment of Memoranda of Understanding between regulatory authorities and customs in 15 countries (Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela) and regional mapping by category of all the industrial irradiators and industrial radiography equipment in the region, including their authorization status.

C.5.9. Nuclear security

191. Training provided under RLA/9/059, 'Awareness Raising and Training for Nuclear Security', supports the implementation of the Agency's Nuclear Security Plan (2006–2009) by increasing national awareness and capacities in the target countries for the prevention, detection and response to malicious acts involving nuclear and other radioactive materials or facilities, and illicit trafficking of nuclear and other radioactive materials. As a result of the project, awareness of measures to establish and maintain an effective nuclear security regime has been raised among decision makers and senior officers of regulatory authorities, operators and law enforcement agencies. Nuclear security culture has been fostered and cooperation between participating countries in the region has been strengthened.

192. Under RLA/9/063, 'Developing Human Resources in Nuclear Security', the Agency assists Member States in the region in their efforts to develop sustainable human resources to improve nuclear security infrastructures. The assistance provided focuses on the provision of human capacity building measures such as fellowships, regional training, technical visits, on-the-job training and the implementation of international legal instruments. This project is funded through the Nuclear Security Fund and trains law enforcement agencies (police, customs, and civil protection) and radiation safety regulatory authorities from all Member States in the region. In 2009, two training courses were provided for 25 managers and decision-making officials, raising their awareness of the need to combat illicit trafficking in nuclear and other radioactive material. Twenty-one participants from national nuclear or radiation protection regulatory agencies and users of radioactive materials were trained on issues related to the security of radioactive sources.

List of acronyms

AAPM - American Association of Physicists in Medicine

ACC - Blida Anti-Cancer Centre

ACS - Association of Caribbean States

AFOMP - Asia–Oceania Federation of Organizations for Medical Physics

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

Agency - International Atomic Energy Agency

AIDA - Artificial Insemination Database Application

ALFIM - Latin American Medical Physics Association

ANENT - Asian Network for Education in Nuclear Technology

APCs - assessed programme costs

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

ARC-OVI - Agricultural Research Council - Onderstepoort Veterinary Institute

ASAL - arid and semi arid lands

ASO - Applied Sciences in Oncology

BAEC - Bangladesh Atomic Energy Commission

CCCP - Continuous Comprehensive Care Programme

CETI - Centre for Ecotoxicological Research of Montenegro

CIMMYT - International Maize and Wheat Improvement Center

ÇNAEM - Çekmece Nuclear Research and Training Centre

CPF - Country Programme Framework

CQ - chloroquine

CT - computed tomography

CWH - Central Women's hospital

EC - European Commission

ESMP - European School of Medical Physics

ESTRO - European Society for Therapeutic Radiology and Oncology

FAO - Food and Agriculture Organization of the United Nations

FNCA - Forum for Nuclear Cooperation in Asia

FNRBA - Forum of Nuclear Regulatory Bodies in Africa

GEF - Global Environment Facility

HAB - harmful algal bloom

HEU - highly enriched uranium

HR - human resources

IAEA - International Atomic Energy Agency

ICARDA - International Center for Agricultural Research in the Dry Areas

IDN - International Decommissioning Network

INAA - Instrumental Neutron Activation Analysis

INPRO - International Project on Innovative Nuclear Reactors and Fuel Cycles

IOC - Intergovernmental Oceanographic Commission

LBDNET - Latin American Biological Dosimetry Network

LDC - least developed country

LEU - low enriched uranium

MDG - United Nations Millennium Development Goal

NCCR - National Centre of Competence in Research

NESA - Nuclear Energy System Assessment

NGO - non-governmental organization

NLO - National Liaison Officer

NPCs - National Participation Costs

NPP - nuclear power plant

OIE - World Organisation for Animal Health

OIOS - Office of Internal Oversight Services

OLADE - Latin American Energy Organization

PACT - Programme of Action for Cancer Therapy

PCMF - Programme Cycle Management Framework

PET - positron emission tomography

POP - persistent organic pollutant

PSP - paralytic shellfish poisoning

QA - quality assurance

QC - quality control

RBA - receptor binding assay

RBM – results based management

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

RCARO - RCA Regional Office

RSA - Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the International Atomic Energy Agency

SIT - sterile insect technique

TB - tuberculosis

TC - technical cooperation

TCDC - technical cooperation among developing countries

TCF - Technical Cooperation Fund

TSA - thematic safety area

TXRF - total reflection X-ray fluorescence

UNDAF - United Nations Development Assistance Framework

UNESCO - United Nations Educational, Scientific and Cultural Organization

WHO - World Health Organization

WNU - World Nuclear University

WWER - water cooled, water moderated power reactor

XRF - X-ray fluorescence

Glossary

adjusted budget - 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. Adjusted budget = new obligations + funds available.

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

counterpart - the national official in a Member State who is designated as responsible for the overall management and direction of a TC project.

counterpart institute - the institution in a Member State which is the point of contact for liaising with TC on a specific project. The institution may, depending on the project plan, carry out management or implementation responsibilities for a TC project.

Country Programme Framework (CPF) - the CPF is 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 for the medium term (4-6 years). It serves to ensure that the TC projects are effectively focused on agreed needs and priorities within the overall framework of the Member State's national plan for the use of nuclear related technology. CPFs also relate to the country's development aims in specific sectors taking the relevant UN Millennium Development Goals into account.

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

extrabudgetary contribution - contributions offered to the Agency by: Governments of Member States of the Agency, in addition to their contribution to TCF; Governments of other States which are Members of the United Nations or of any of the specialized agencies; organizations which have concluded an appropriate relationship agreement with the Agency; other intergovernmental organizations; and non-governmental sources. Extrabudgetary contributions are generally made to fund footnote-a/ projects and to support training events or special programmes.

fellowship - TC project-related practical/on-the-job training of candidates (duration from one month up to one year) or long-term academic training (MSc or PhD). Fellowships are usually awarded to university graduates and technicians.

financial delivery - actual cash outlays and obligations for goods provided and services rendered during TC programme delivery.

financial indicators - TC programme inputs such as disbursements and obligations.

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

impact - see outcome.

implementation (in financial terms) - the volume of funds obligated (new obligations) in a given period.

implementation rate - the rate of financial expenditure, but not the progress made, in delivering actual outputs. A percentage figure obtained by dividing the value of new obligations by the total adjusted TC programme.

in-kind contribution - these contributions are 'gifts' of services, equipment and facilities made available to the Agency by: Governments of Member States of the Agency; Governments of other States which are Members of the UN or of any of the specialized agencies; organizations which have concluded an appropriate relationship agreement with the Agency; other intergovernmental organizations; and non-governmental sources. Official in-kind credit is given, and reflected in the Accounts of the Agency, for providing expert and training course lecturer services fully or partially cost-free in countries other than their own; sponsoring

training course participants from countries other than their own; providing full or partially cost-free fellowship training; and donating equipment that is received by another Member State.

medical physics - the application of physics to medicine. It generally concerns physics as applied to medical imaging and radiotherapy, although a medical physicists may also work in many other areas of healthcare.

Millennium Development Goal (MDG) - eight international development goals that all 192 United Nations Member States and at least 23 international organizations have agreed to achieve by the year 2015.

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

non-financial indicator - outputs such as experts deployed, training courses conducted or purchase orders placed.

National Participation Costs (NPCs) - as of January 2005, 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. The remainder, based on actual delivery, is paid upon completion of the project. This mechanism replaces assessed programme costs which were suspended in 2004 (see document GOV/2004/46).

Nuclear Security Fund - a voluntary funding mechanism to which Member States are called upon to contribute to support, amongst others things, the implementation of nuclear security activities to prevent, detect and respond to nuclear terrorism.

obligations - amounts recorded in the accounts of the Agency representing expected cost for activities contracted or otherwise formally undertaken, where there is the expectation that payment must be made from project resources.

outcome - the planned or achieved medium-term result of a programme or project, achieved through the collective effort of stakeholders and partners. An outcome represents changes in development conditions which occur after the achievement of outputs. Outcomes are achieved at the completion of a project.

output - the specific product, which results from the inputs supplied to a project and the activities undertaken within the project.

performance indicator (PI) - indicators for outcomes are referred to as ‘performance indicators’, and project progress is reviewed against these performance indicators. Indicators refer to a feature, characteristic, or yardstick used to ‘measure’ or observe (indicate) progress over a period of time. The statement of a performance indicator usually includes a baseline, target and means of verification.

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.

Revised Supplementary Agreement (RSA) - agreements that 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.

scientific visit - a scientific visit is a short-term scholarship which is awarded to senior scientists, heads of research groups and directors of research centres to enable them to visit research institutes, nuclear power facilities and laboratories for the purpose of observing the development of nuclear science, research and technology, or to study the organization and functional aspects of such facilities. Scientific visits also provide the opportunity to make contacts and develop relationships with colleagues in other countries for the purpose of furthering professional collaboration and the exchange of scientific information. The duration of a scientific visit is usually two weeks.

stakeholder - individuals or groups that are either directly affected by, or can influence, the activities of an organization.

Technical Cooperation Fund (TCF) - the main fund for the financing of the Agency's technical cooperation activities. It is funded by the voluntary contributions of Member States, national participation costs, assessed programme costs arrears and miscellaneous income.

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

unobligated balance - total funds available less disbursements and less unliquidated obligations against the current year.

voluntary contributions - contributions of Member States (or international organizations, or other) that are not compulsory, but voluntary like the TCF.

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