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RCA ANNUAL REPORT 2003

IAEA
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This annual Report is divided into 3 parts:

Executive Summary

- Part I contains the highlights of the RCA programme in 2003
- Part II describes the significant activities (such as expert missions, meetings and workshops) implemented under each of the RCA projects
- Part III indicates the involvement of Member States in the RCA programme in terms of in-kind contributions in relation to hosting of events and fellows. This part also includes RCA projects achievements of respective country.

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PART I - PROJECT IMPLEMENTATION SECTION

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PART I PROJECT IMPLEMENTATION SECTION

1.1 Brief Overview

1. 38 RCA projects in Agricultural, Health, Industrial, Environmental Energy and Radiation Protection sectors were implemented in 2003. The National Representatives, on the recommendation of the thematic Lead Country Coordinators, approved the RCA Programme for 2005/2006 comprising of 24 projects of which 16 are new and 8 are extensions and continuations of ongoing projects.
2. Two policy-level meetings, the 25th Meeting of the National RCA Representatives' and the 32nd RCA General Conference Meeting, were held in May and September respectively to resolve RCA management and programme related issues.
3. A Quadripartite (AFRA/ARCAL/ ARASIA/ RCA) Meeting held on the 18th of September continued the TCDC (Technical Cooperation among Developing Countries) dialogue among these regional partners and identified additional technology transfer initiatives.
4. A Lead Country Coordinators' Meeting was held in August 2003 to identify the projects to be implemented under the 2005/2006 programme. A briefing of Mission Representatives based in Vienna was also held in August to appraise the

progress in the RCA programme and to prepare for the General Conference.

5. During the year, the RCA programme continued to receive donor extrabudgetary contributions. Australia, China, Indonesia, Japan, Republic of Korea, Malaysia and the Philippines contributed additional extrabudgetary funds amounting to 483,394.60 US\$. Annex 1 shows the status of new extrabudgetary funds received from 1994 to the end of December 2003.

1.2 RCA Programme in 2003

1. There were 38 active projects in the RCA programme during the year 2003 with 15 new projects for the 2003/2004 biennium and 10 extensions* and 1 continuation** from the previous cycle. There were 12 rollover*** projects. The projects were related to agriculture, health, environment, industry, radiation protection, energy, research reactor utilization, radioactive waste management and TCDC.

The budget approved for 2003 was 5.245 million US\$ out of which 2.820 million US\$ was hardcore funding as shown in Annex 2. 9 projects listed in Annex 3 were closed in 2003.

**Extensions: Projects initially planned for implementation during one programming cycle and subsequently extended to the next programming cycle.*

*** Continuations: Projects that were planned to be implemented over a period beyond the implementation cycle of two years.*

**** Rollover projects: Projects in which the planned activities have not been completed during the period they were planned for*

2. 45 RCA events comprising of 22 training courses, and 23 meetings/workshops were held in 2003,

compared to 31 Training Courses and 28 Meetings/ Workshops in 2002. The implementation of the programme was affected by Severe Acute Respiratory Syndrome (SARS) during the first half of 2003, and a number of events planned had to be postponed to the latter part of the year or to 2004. The list of RCA events held in 2003 is given in Annex 4. 260 Participated in the RCA events held in 2003. Annex 5 shows the regional training courses implemented during the year and the number of participants from the respective RCA countries. MSs in the region hosted most of the courses. Annex 6 shows the number of events hosted by Member States.

There were 20 expert missions fielded to 9 countries in the region during 2003. Annex 7 shows the origin of experts and the duty stations, and the duration of the missions was 117 man-days

1.3 RCA Programme in 2004.

The RCA Programme for 2004, will comprise of 28 active projects, comprising of 5 projects in Agriculture, 7 in Environment, 1 in Energy, 4 in Industry, 6 in Human Health, 3 in Radiation Protection, 1 on Research Reactor Utilization, and 1 on Management of TCDC. In addition, 19 Training courses and 21 Workshops/Meetings are planned for 2004. The schedule of planned events is given in Annex 8.

1.4 Proposed Programme for 2005/2006

The Lead Country Coordinator's Meeting held on 4-8 August 2003 at

IAEA Headquarters reviewed 84 project proposals received from the Member States and recommended a programme comprising of 24 projects for implementation in 2005/2006.

The recommended programme is given in Annex 9. The proposed programme was approved at the General Conference Meeting of the National RCA Representatives held in September 2003.

2. RCA Management

2.1 Policy Meetings

Two policy level meetings of the RCA were held in 2003, namely, the 25th Meeting of National RCA Representatives (Colombo Sri Lanka, 26-28 May 2003), and the 32nd RCA General Conference Meeting (Vienna, 17 September 2003).

The National RCA Representatives discussed and/or decided on the following at these meetings.

- Adoption of the reports of the previous meetings
- Adoption of the Annual Report for 2002
- Approval of the programme for 2005/2006 recommended by the Lead Country Coordinators
- Recommendations of the Lead Country Coordinators on operational matters
- Adoption of a resolution on the RCARO
- Evaluation of the RCA programme
- Holding of a strategic session during the next Meeting of the National Representatives
- Establishment of a task group to look into the management of the RCA

- Re-designing the RCA Logo
- Utilization of the Regional Resource Units
- RCA Home page

2.2 Lead Countries

Lead Countries and Assistant Lead Countries continued to play an important part in the development of projects for 2005/2006, as well as in the monitoring of activities in 2003. Republic of Korea coordinated the preparation of proposals on energy and research reactor utilization; China on agriculture related projects; Japan on projects related to health; Australia on radiation protection; India on industry and New Zealand on environment.

2.3 RCA Regional Office in Republic of Korea

In accordance with the decision by the MSs at the 30th RCA GC Meeting held in September 2001, the RCA Regional Office was established on 27 March 2002 for an interim operational period of two years. It was then extended for another year at the 32nd RCA GC Meeting. The 32nd GC Meeting also adopted a resolution on the establishment of the RCARO.

Under the mandate given to the RCARO to improve the visibility of the RCA in the region and to improve the viability of RCA by establishing partnerships, RCARO is in the process of entering into a MOU with ESCAP. It has also established a web-page (www.rcaro.org) to publicize the activities of the RCA. RCARO plans to establish more links with other international organizations in 2004, and to publish an RCA Information Kit. RCARO has also

commenced Post doctoral and Masters degree courses for preservation of nuclear knowledge.

2.4 Regional Resource Units (RRUs)

13 out of the 17 RCA Member States have established 34 Regional Resource Units in the following areas. Isotope Hydrology (3), Monitoring of Marine Pollution (6), Monitoring of Air-pollution (9), Radiation Processing (3), Electronic Networking and Outreach (4), Tissue Banking (2), Gamma Irradiation Services (1), Geothermal Explorations (1), Dam Safety (1), Neonatal Screening for Hypothyroidism(1), N-15 Analysis (1), Production of RIA Reagents (1), and NCS and Tracer Technology (1). The RRUs provided laboratory services, experts and training facilities for the implementation of the RCA projects in their respective areas. A data-base on RRUs is being prepared under the Project on Electronic Networking and Outreach and is expected to be completed during the first quarter of 2004.

2.5 Extension of RCA Agreement

Sixteen countries, namely Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka Thailand and Vietnam, have informed of their agreement to extend the 1987 Regional Cooperative Agreement for another five years, until 11 June 2007.

3. Project Achievements.

A summary of the significant achievements of the RCA projects implemented in 2003 is given below.¹

3.1 Environmental Sector:

RAS/7/013 “Improved Information about Urban Air Quality Management”

The work initiated under the UNDP supported project “Isotopic and Related Techniques to Assess Air-Pollution” (RAS/8/082) was continued under this project. The previous projects on monitoring air-pollution, have significantly contributed to the region’s understanding of air pollution issues relating to fine and coarse particles, and produced regional, national and international impact. 15 Member States out of 17 actively participated in the current project (RAS/7/013). Following is a brief summary of the progress achieved.

- Elemental analysis using nuclear techniques(NAA, XRF, and PIXE) and measuring black carbon in air-samples collected at urban and rural sites have been completed.
- Most of the participating countries have been able to identify the critical sources of pollution using the above data.
- National databases on air-pollution have been created. Additional elemental data is needed to make the databases complete.
- Data on air-pollution generated under the project are being used by the national organizations responsible for controlling air-pollution in most of the participating Member States, for setting standards and making policy decisions.

- The project counter-parts worked in collaboration with the national programmes on air-pollution control, funded by the Governments or international organizations such as the World Bank and UNEP.
- A number of participating member states have made financial contributions to the project.
- 9 Regional Resource Units (RRUs) have been established in 9 Member States for sample analysis and data interpretation.
- Seven scientific papers were published.
- QA/QC programmes were established for air-sampling and elemental analysis.

RAS7011- “Enhancing the Marine Coastal Environment (Phase II)”

The work initiated under the project, “Management of Marine Coastal Environmental Pollution” (RAS8083) was continued under this project. The objectives of the project are to update and maintain the Asia Pacific Marine Radioactivity database (ASPAMARD), discern organic sources of pollution and to support Member States to incorporate receptor binding assay (RBA) in their national monitoring programme for harmful algal bloom(HAB).

- The analysis of the samples by participating scientists was completed and a consultant from the region was engaged to produce an updated version of ASPAMARD. A scientific manuscript based on the findings has been prepared for

¹ Part II provides more details in project activities.

publication in the Journal of Environmental radioactivity.

- Arrangements were made to conduct a regional training course on “Application of Nuclear and Isotope Techniques to Identify the Source and Distribution of Contaminants in Heavily Polluted Coastal Regions” in the Philippines in January 2004.
- Protocols for synthesis of tritium-labeled saxitoxin and for the use of tritium-labeled saxitoxin in receptor binding assays (RBA) have been developed. However, it has not been possible to produce the reagents with a sufficiently high specific activity and of required radiochemical purity. US Food and Drug Administration (USFDA) has been successful in producing reagents of required quality and has agreed to provide it to the Member States free of charge for a period of three years.

3.2 Industry

RAS 8096 “Modification of Natural Polymers through Radiation Processing”

The objectives of this project are to demonstrate the production of useful products from indigenous natural polymers and to increase the use of indigenous natural polymers through the use of radiation processing. The following is a brief summary of the progress achieved.

- Hydrogel wound dressings developed from natural polymers using radiation technology are being used on a commercial scale in India, China and Malaysia, as a dressing for burns and

wounds. It is in the process of being commercialized in the Philippines.

- Radiation technology has been applied to natural polymers such as carboxymethylcellulose to produce totally natural polymer based hydrogels. Such hydrogels have been found to have excellent cushioning effects that prevents formation of bedsores in patients during long term hospitalization. Gel mats prepared from this material have been commercialized in Japan under the trade name “Non-bedsores”.
- A radiation processed PVA/PVP hydrogel containing sago starch has been successfully developed in Malaysia for cosmetic applications. The end-users have tested the product and an agreement has been signed with a commercial company to produce it on a large scale.
- Growth promoters for cucumber have been developed in China using radiation processed natural polymers. The trials carried out using this material has produced an increase in the yield of 15-20%, and has improved seedling quality and other characteristics.
- The use of oligo-saccharides for treatment of cancer is gaining importance in recent years. However, the conventional methods of the production like acid hydrolysis require very drastic conditions to achieve the end product. Radiation processing offers a clean method for producing materials provided the dose requirement to reduce the degree of polymerization is low. Studies on the fractionation of the irradiated polymer solution at low doses are being carried out to separate the low molecular weight fraction before further irradiation.

- Studies on the use of radiation processed natural polymers as a drug delivery system and for removal of toxic metals from water are carried out under the project.

RAS8091 “Process Diagnostics and Optimization in Petrochemical Industry”

The objective of this project is to upgrade the regional capacity for on-line troubleshooting and process control in petroleum/chemical industries using radioisotope techniques. A number of participating Member States have developed the capacity for providing services to the industry using isotope techniques. Examples are given below.

- Vietnam has signed a half million US\$ contract with oil companies for using tracers in off shore investigations. The benefit of oil industry is estimated to be several million US\$.
- Indonesia is using radioisotope techniques (gamma scanning and leak detection) for solving many problems of petrochemical industries bringing an income of around 50,000 US\$. The benefit to the industry is estimated to be 1 million US\$.
- India has tested gamma tomography of distillation columns, which will improve the quality and reliability of process inspection.
- China has introduced gamma and neutron interface and level gauges to oil industry, for oil separator monitoring, bringing an income of around 50,000 US\$. The benefit to the oil industry is estimated to be several million US\$.
- Republic of Korea has introduced computer fluid dynamics (CFD) method for investigating wastewater

installations, improving their design and efficiency.

- Thailand is providing routine inspection and trouble shooting services to the industry using gamma scanning and leak detection technique. This has generated an income of approximately 30,000 US\$, and the benefit to the industry is estimated to be more than half a million US\$.
- Pakistan has introduced the thin layer activation (TLA) technique for wear monitoring to car industry.

3.3 Energy

RAS038 “Role of Nuclear Power and Other Energy Options in Competitive Electricity Markets”.

The objectives of this project which commenced in 2003, are to enhance the capability of the participating Member States to develop sustainable energy strategies, to conduct national studies to assess the role of nuclear power and other energy options in competitive electricity markets and to provide recommendations on policies and measures that ensure competitive electricity markets. The following is a brief summary of the progress achieved in 2003.

- Nineteen participants from the participating Member States were provided hands-on training on the computer model (MESSAGE) for analyzing the role of nuclear power and other energy options in competitive electricity markets. The training covered the methodology of the model, its operational instructions, data requirements and interpretation of results.

- National teams have been formed and have built case studies relevant to their countries.
- The results of the case studies will be presented and alternative scenarios for each participating Member State will be discussed at a regional meeting to be held in February 2004, in Hanoi, Vietnam.

3.4 Agriculture

RAS5039 "Restoration of Soil Fertility and Sustenance of Agricultural Productivity"

The project has 2 components: one on integrated nutrient, crop and water management practices for increased crop production and component 2 on soil erosion and degradation.

- Under component 1, valuable quantitative information on the fate and efficiency of applied fertilizers has been obtained by using N-15 labeled fertilizers. This information will be used to develop management practices that will lead to improvement of the utilization of nitrogen fertilizers in rice based cropping systems. Only 30-40% of the applied nitrogen fertilizer is utilized by the crops at present.
- Incorporation of grain legumes to rice-based cropping systems has demonstrated promising results in saving fertilizer nitrogen inputs and increasing overall crop productivity.
- The counter-parts of the project are interacting effectively with extension organizations and farmers for better understanding of their crop and fertilizer practices to ensure technology options under development and evaluation are tailored to solving local production

constraints and meeting the needs of the farmers.

- Under component 2, substantial progress has been made in strengthening national capabilities for the harmonized application of the Cs-137 techniques to obtain soil erosion/sedimentation rates and spatial patterns at the landscape level. Mullet-disciplinary teams have been established and partnerships (inter-institutional) at national level have been created.

The project achievements will enable the participating Member States to apply radioisotope techniques to study and control soil erosion/sedimentation contributing to the conservation of the natural resource base and protection of the environment.

RAS5040 "Enhancement of Genetic Diversity in Food, Pulses and Oil Crops and Establishment of Mutant Germplasm Network"

The objectives of this project are to use radiation-induced mutation breeding technology combined with biotechnology to develop improved germplasm of food crops, oil crops and pulses, and to establish a Mutant Germplasm Network of promising selected crops.

- Three groups of Regional Mutant Multi-locational Trials (RMMTs) for food crops, legumes, and sesame are being conducted under this project. Several mutant varieties have been found to be productive outside the donor country. For example five mutant mung bean varieties from other countries were found to have high yield potential in Pakistan.
- Substantial progress was made in enhancement of genetic diversity in many participating countries.

Examples are, selection of drought tolerant wheat mutants in China, sesame mutants with less-shattering in Republic of Korea, and virus resistant and high yielding mung bean mutants in Pakistan.

- New mutation induction programmes have been initiated under this project in some countries. Examples are sesame and ground nut in the Philippines, sesame in Vietnam and groundnut in Sri Lanka.
- Training on the use of induced mutation breeding was provided to the participating Member States, resulting in the improvement of crop breeding programmes in these countries.

RAS5041 "Production of Foot and Mouth Disease Antigen and Antibody ELISA Reagent Kits

The objective of this project is to produce and make available enzyme-linked immunosorbent assay (ELISA) kits for diagnosis of foot and mouth disease (FMD) at a lower cost than what is commercially available so as to assist in the control and eventual eradication of FMD in the East Asia and Pacific region. The following is a brief summary of the progress achieved.

- The Pakchong laboratory in Thailand was selected as the reference center for production of the reagent kits for distribution to the participating Member States. The production of serum from rabbits and guinea pigs will be carried out in the Geelong laboratory in Australia. The sera is expected to be available by the end of February 2004. Training will be provided to participating Member States on the use of kits after the kits are produced by the Pakong laboratory. The project

objectives are expected to be met before the end of 2004.

4. Inter-Regional Cooperation

4.1 AFRA/ ARCAL/ ARASIA/ RCA Quadripartite Meeting

RCA participated in the AFRA/ARCAL/ARASIA/RCA quadripartite meeting held on the 18th of September 2003. The Meeting was chaired by ARCAL. The meeting reviewed the progress made during the previous year in promotion of TCDC among regional agreements through exchange of expertise between the regions, flow of nuclear services and goods between the regions and progress achieved in joint/common activities. Two presentations of success stories were made by AFRA, ARCAL and RCA. RCA National Representative for India, which is the Lead Country for the Industrial Sector, presented RCA Success Stories in industry, and the RCA National Representative of New Zealand, which is the Lead Country for the Environmental Sector presented success stories in environmental protection.

4.2 FNCA

The FNCA Coordinator of Japan attended the 25th RCA Meeting of National Representatives held in Colombo, Sri Lanka. The FNCA was also represented at the 24th Meeting of the National Representatives and at the 31st RCA GC meeting. The presentation made by the FNCA Coordinator highlighted the Vision and the Goals of the FNCA and a summary of the progress achieved in eleven projects on

Research Reactor Applications, Agriculture, Human Health, Industry, Waste Management, Nuclear Safety, Human Resources Development and Public Information. The desirability of synergy between RCA and FNCA was emphasized to avoid duplication or overlap of activities.

5. In-kind Contributions

A summary of the in-kind contributions received, based on the information provided by the Member States is given in Annex 10.

6. FINANCIAL STATUS

The adjusted budget at the beginning of 2003 was 4.805 million US\$, comprising of 2.820 million US\$ approved for 2003 and 1.985 million US\$ carried over from 2002, compared to an adjusted budget of 4.580 million US\$ for 2002 comprising of an approval of 2.666 US\$ and carried over funds of 1.914 million US\$.

The implementation and implementation rate at the end of 2003 was 2.366 million US\$ and 58.20% respectively, compared with 2.819 million US\$ and 58.70% respectively for 2002. The implementation rate for the East Asia and Pacific Section in 2003 was 55.5%.

7. Personnel Changes in Member States and Secretariat

7.1 National RCA Representatives

Dr. Ron Cameron succeeded Dr. John Rolland, who made a significant contribution to RCA activities, as the National Representative of Australia. His services to the RCA are greatly appreciated.

Dr. Pathom Yamkate succeeded Dr. Manoon Aramrattana as the National Representative of Thailand. His contribution to the RCA during long years of service is appreciated.

Dr. N. Choudhary retired from service after serving as the Chairman of the Bangladesh Atomic Energy Commission and the National RCA Representative for Bangladesh. Dr. Choudhary also served as the Chairman of the Advisory Committee of the RCARO and made numerous other contributions to the programme. His contribution to the RCA is appreciated.

The current list of National Representatives is given in Annex 11. *Lists of National Project Coordinators are given in Annex 12. (To be posted on the web- if the no. of pages is extensive)*

7.2 Agency Staff

Dr. Carlito Aleta of the Philippines retired from the Agency after serving as the RCA Coordinator for a period of 6 years. The Member States adopted a resolution appreciating his services to the RCA at the 25th Meeting of the National RCA Representatives held in Colombo, Sri Lanka. Prof. Prinath Dias of Sri Lanka who succeeded Dr. Aleta as the RCA Coordinator assumed duties in June 2003.

Dr. M.N. Razley retired from the Agency in December 2003, after serving as the Head of the East Asia and Pacific Section for 7 years and 9 months. He received a Merit Award from the Agency for his very significant contribution to the East Asia and Pacific Section. He has also served as the Acting

RCA Coordinator and his contribution to the RCA is appreciated.

Mr. K.P. Kim of the Republic of Korea left the Agency in October 2003 after serving as a Programme Management Officer for a period of 3 years. He received a Merit Award from the Agency for his excellent services to the RCA. His contribution to the RCA is appreciated.

Annexes

- . Annex 1 -Extra Budgetary Contributions
- Annex 2 - 2003/2004 Budget approvals
- Annex 3 - Projects to be closed
- Annex 4 Events in 2003
- Annex 5-Participation by Country
- Annex 6 - Number of Events Hosted
- Annex 7 Experts
- Annex 8 - Events Planned for 2004
- Annex 9 - Projects for 2005/2006 (funds)
- Annex 10 - In-kind Contributions
- Annex 11 - National Representatives (up-date)
- Annex 12- National project Coordinators.