

REGIONAL CO-OPERATIVE AGREEMENT  
INTERNATIONAL ATOMIC ENERGY AGENCY



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IAEA-RCA-95-05

SEVENTEENTH WORKING GROUP MEETING  
OF  
REPRESENTATIVES OF RCA MEMBER STATES

REPORT

Kuala Lumpur, Malaysia  
27 - 30 March 1995



**SEVENTEENTH RCA WORKING GROUP MEETING**  
**KUALA LUMPUR, MALAYSIA, 27 - 30 MARCH 1995**

**EXECUTIVE SUMMARY**

The 17th RCA Working Group Meeting was held in Kuala Lumpur, Malaysia from 27 to 30 March 1995 and was attended by 41 participants from 15 RCA Member States. Only India and Myanmar were not able to be represented. Mr. El-Saiedi represented the IAEA.

The Government of Malaysia represented by the Minister of Science, Technology and the Environment Datuk Law Hieng Ding at the opening ceremony.

The highlights of the Meeting were:

the Meeting accepted and approved:

- the draft RCA Annual Report for 1994
- the Action Plan for 1995
- the Budget and Budget Estimates for 1995

Republic of Korea confirmed that they would support financially the RCA project on nuclear power planning strategies.

The Meeting recommended support for the following proposals in the RCA programme:

- Transfer of Technology for the Production of <sup>60</sup>Co. sources for Brachytherapy.
- Regional Training Course on Probabilistic Safety Assessment and its Industrial and Environmental Applications.

- Storage and Planning for the Disposal of Radioactive Wastes from Non-power Sources.
- Marine Contamination and Transport Phenomena.

The Meeting requested further elaboration of the following proposals:

- Determination of Glomerular Filtration Rate;
- Enhancement of the Production and Quality Control of Radioisotopes and Pharmaceuticals; and,
- Regional Training Course on Noise Analysis and its Applications.

Additional items agreed at the Meeting were:

- that the role of RCA Chairman remain unchanged and be confined to the RCA Working Group and General Conference Meeting;
- that the RCA Co-ordinator position remain at its present level and there should be a smooth transition between the current encumbant and the successor;
- that the current system of Project Formulation Meetings and National Co-ordinators Meetings were effective instruments for the development, monitoring and assessment of the RCA Programme and should continue.

Bangladesh indicated the possibility of hosting the 18th RCA Working Group Meeting in Dhaka in 1996.



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**SEVENTEENTH RCA WORKING GROUP MEETING**  
**KUALA LUMPUR, MALAYSIA, 27 - 30 MARCH 1995**

The Seventeenth RCA Working Group Meeting was held in Kuala Lumpur, Malaysia on 27 - 30 March 1995. It was attended by 41 participants from 15 RCA Member States (Annex 1). India and Myanmar were not able to be represented. In addition, there were 17 observers from Malaysia. The International Atomic Energy Agency (IAEA) delegation was led by Mr. Ali F. El-Saiedi, Director, Technical Cooperation Implementation Division. The Honourable Minister of Science, Technology and the Environment of Malaysia, Datuk Law Hieng Ding, officiated at the inauguration of the Meeting, on behalf of the Government of Malaysia.

**INAUGURAL SESSION**

**1. Welcoming Remarks of the Chairman of the Organizing Committee**

Dr. Ahmad Sobri Haji Hashim, the Director General of the Malaysian Institute for Nuclear Technology Research (MINT), and Chairman of the Organizing Committee, welcomed delegates to the Meeting. He indicated that this Meeting was one of the three consecutive RCA-related meetings scheduled in Malaysia over a duration of two weeks.

He explained that since the last RCA Working Group Meeting held in Kuala Lumpur, in 1982, the host institution has assumed the new name, MINT, to clearly reflect its status as an organization focused on the research, development and provision of non-power nuclear technology products and services targeted at major economic groups, namely, the industrial, medical and agricultural sectors. He subsequently outlined the tentative agenda of the Meeting. The full text is given in Annex 2.

**2. Welcoming Address on Behalf of the IAEA**

In his welcoming address on behalf of the IAEA, Mr. Ali F. El-Saiedi brought to the attention of the RCA Delegates the United Nations Development Programme's (UNDP) major Mid-term Review of All Regional Programmes in Asia and the Pacific Region. He emphasized that the UNDP Executive Board was not impressed by mere numbers as an indicator for a successful programme but it was the impact of the programme which was of major concern. He added that the provision of feedback on and illustrations of results achieved by Member States were very important in furthering the profile and continuity of the RCA Programme. In this regard, he urged the Meeting to discuss strengthening the field management of the RCA.

He pointed out that one notable feature of the RCA is the positive attitude of Member States towards assuming a greater role in the financing of the Programme. At the last General Conference, financial contributions indicated by 10 Member States for the 1995 programme amounted to US\$1.25 million. Nevertheless, he cautioned Delegates that the prospect for future UNDP funding for the joint UNDP/RCA/IAEA Project is extremely bleak, with the UNDP pressing to cease its contribution by the end of 1995. Member States were therefore urged to consider whether they ought to make approaches to alternative funding bodies for further support. He reminded them that it was important for Member States to identify good projects and prepare well constructed proposals in order to positively influence donors. The full text of his address is given in Annex 3.

### **3. Inauguration Address on Behalf of the Government of Malaysia**

On behalf of the Government of Malaysia, the Honourable Minister of Science, Technology and the Environment, Datuk Law Hieng Ding, welcomed all RCA Delegates, in particular those Member States who were represented at an RCA Working Group Meeting in Malaysia for the first time, namely, Singapore, New Zealand, Mongolia and Viet Nam. He congratulated the IAEA, which, through the RCA, had established a greater understanding and cooperation within the Asia and Pacific region. It had promoted efficient use of resources for the development and utilization of nuclear technology over a wide range of regional concerns. He reiterated Malaysia's support for the RCA and restated Malaysia's pledge of US\$ 50,000 for the present cycle.

He also expressed concern over the discouraging report by the UNDP of the Mid-term Review for the Inter-country Programme, fifth cycle, which includes the UNDP/RCA/IAEA Project. Nevertheless, he added that with Member States in varying stages of development and differing sets of national priorities and concerns, such a report was expected. With regards to future UNDP funding, he suggested an impact-oriented approach, blending UNDP-funded inter-country programmes with UNDP-funded country programmes for the least developed Member States. The better developed Member States may be awarded funding in the form of contracts to assist lesser developed members, he added. In conclusion, he urged that future activities be focused on the applications of nuclear science and technology in tackling the problems of environmental degradation. The full text of the address is given in Annex 4.

## **FIRST ADMINISTRATIVE SESSION**

The Interim Chairman, Dr. Nazir Abdullah, on behalf of the Government of Indonesia, expressed his gratitude to the Member States for their support over the past year.

### **4. Election of Chairman**

Australia nominated Dr. Ahmad Sobri Haji Hashim, the Director General of the Malaysian Institute for Nuclear Technology Research (MINT) as the Chairman of the Seventeenth RCA Working Group Meeting and was seconded by the Philippines. Dr. Ahmad Sobri was then unanimously elected to the Chair.

On assuming the Chair, Dr. Ahmad Sobri thanked the Government of Indonesia for its contribution to the Meeting last year and to the Delegates for unanimously electing him to the Chair. He once again welcomed all Delegations, especially the Delegates from Singapore, New Zealand, Mongolia and Viet Nam, who were attending their first RCA Working Group Meeting in Malaysia and wished them a pleasant stay in Malaysia.

He also expressed hope that the Delegates would participate fully in deliberating and overcoming the issues facing the RCA, particularly on the question of future UNDP funding.

### **5. Adoption of the Agenda**

In reviewing the tentative Agenda for the Meeting, the Republic of Korea proposed that certain technical sessions be delayed to allow more time for Delegates to study documents only just circulated. Since the RCA Coordinator was expected to attend another parallel UNDP meeting, the Republic of Korea and New Zealand suggested that further changes be made to ensure that the RCA Coordinator be present during the crucial discussion on the Joint UNDP/RCA/IAEA Project. They said it was important that the RCA Coordinator introduce the report to the Meeting. The Delegates subsequently endorsed these proposed changes and the revised Agenda appear as Annex 5.

**6. Draft RCA Annual Report, 1994**

In discussing the 1994 Draft RCA Annual Report, the Philippines noted that the Sixteenth RCA Working Group Meeting read "as was held in Bali, Indonesia". Upon Japan's proposal, the Meeting unanimously adopted the Draft RCA Annual Report, 1994, as amended.

**7. Election of the Chairpersons for Project Committees**

The results of the election were as follows:

a) Medical and Biological Applications of Nuclear Techniques

**Prof. Ch'ng Soo Ling**

Head, Clinical Diagnostic Laboratory  
University Hospital (UHUM)  
University of Malaya  
59100 Kuala Lumpur, Malaysia

Nominated by: Indonesia

Seconded by: Thailand

b) Agricultural Projects

**Dr. Zaharah Abdul Rahman**

Associate Professor, Department of Soil Science  
Agricultural University of Malaysia (UPM)  
43400 Serdang, Selangor Darul Ehsan  
Malaysia

Nominated by: Philippines

Seconded by: China



c) Agricultural Projects

**Dr. Nahrul Khair Alang Md. Rashid**

Deputy Director General

Malaysian Institute for Nuclear Technology Research (MINT)

Bangi

43000 Kajang, Selangor Darul Ehsan

Malaysia

Nominated by: Republic of Korea

Seconded by: Mongolia

d) Radiation Protection Projects

**Mr. Yusof Ismail**

Director General

Atomic Energy Licensing Board (LPTA)

Floor 13 Plaza Petaling

Jalan Tun Razak

50400 Kuala Lumpur

Malaysia

Nominated by: Japan

Seconded by: Sri Lanka

**8. Policy Review Seminar**

On behalf of the IAEA, Mr. El-Saiedi, Director of Technical Cooperation Implementation, briefly summarized the conclusions of the Policy Review Seminar held in Vienna on 15 - 16 September 1994, just prior to the 38th IAEA General Conference.

He reported the Policy Review Seminar focused on the following themes: the significance of Mid-term Country Programmes; the importance of a radiation protection and waste management infrastructure within the Member States; and, the impact of technical assistance on the development in Member States. He said that,

subsequently, the IAEA had started embarking on missions to several countries to compile country profiles based on their national priorities. Future national technical assistance will be linked to these country profiles. Such technical assistance will concentrate on delivering a quality programme and on the development of new strategies to maximize impact.

## **FIRST TECHNICAL SESSION**

### **MEDICAL & BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES**

Chairman: **Prof. Ch'ng Soo Ling**  
Head, Clinical Diagnostic Laboratory, UHUM

Rapporteurs: **Mr. Izhar Abu Hassan**  
Head, Nuclear Instrumentation, MINT

**Dr. Rehir Dahalan**  
Senior Research Officer, Isotopes, MINT

#### **9. Constitution of Project Committee**

The Project Committee was constituted with Professor Ch'ng Soo Ling in the Chair.

#### **10. Technical Cooperation (TC) Projects**

##### **10.1 Radioimmunoassay for Hepatitis B Diagnosis (Annex 6)**

The project was reported to be progressing well. The participating Member States had all taken on the technology for preparing the two most important primary reagents and were now able to prepare solid phase antigen and antibody linked beads using the solutions supplied in bulk form. This step had led to a significant reduction in costs.

The National Co-ordinators Meeting in Sydney had been very useful in bringing out the results of the individual clinical studies into a regional overview and showing the incidence of Hepatitis B in the target groups of pregnant women, blood donors, health care workers and subjects with primary liver cancer.

The Meeting was informed that detailed questionnaires will be distributed to all National Co-ordinators and that the results of these questionnaires will be used to determine the future direction of the activity. The next National Coordinators Meeting later in 1995 will discuss quality assurance issues as well as the possible extension of the project to encompass the diagnosis of Hepatitis C, and issues on the availability of bulk reagents.

#### 10.2 Radiation Sterilization of Biological Tissue Grafts (Annex 7)

The project was reported to have been achieving all its targets. A draft modular curriculum for training had been prepared which covered the whole spectrum of tissue banking and was the first document of its type to be produced anywhere.

The National Co-ordinators Meeting and Mid-Term Review had reviewed the project. The programme for 1995 and 1996 had been discussed in detail and the schedule for the various activities agreed. The increasing contacts of the project with the major tissue banking associations in USA, Europe and Asia were noted. The Meeting was informed that the Project had been successfully implemented by each Member State involved. However, all Member States expressed concern on the retirement of the project Technical Officer, Dr. Mukherjee and that a suitable replacement of equal standing should be quickly appointed by the IAEA.

The Meeting was informed that a Regional Workshop for tissue bank operators would be held in Singapore in 1995. Australia encouraged the use of regional experts where possible.

#### 10.3 Use of Computers in Technetium-99m Imaging (Annex 8)

The Meeting was informed that the course had been very successful. This was the fourth time that this course had been undertaken and each one had received very favourable comments and feedback on its relevance to regional needs. It was planned that the next course be held in 1997, but this time as an inter-regional course.

Australia expressed interest in hosting the 1997 course.

#### **10.4 Strengthening of Nuclear Medicine in RCA Member States (Annex 9)**

It was reported that substantial progress had been achieved during the year following the meeting of the Regional Advisory Committee which set up the curriculum. Modules had been prepared and four Member States were going to trial these materials in a pilot programme. It was noted that distance learning activity formed an integral part of the programme in Nuclear Medicine and Radiation Protection co-ordinated by Australia. The Meeting was informed that attention was being given to the issuing of relevant certificates by the IAEA.

### **11. Coordinated Research Programmes (CRP)**

#### **11.1 Imaging Procedures for the Diagnosis of Liver Diseases: Phase II (Annex 10)**

Japan reported that the Project ended in 1993 and the publication of the Project Report was originally scheduled for the end of 1994. The Report is to be made available to the Member States within a few months time.

#### **11.2 Imaging of Respiratory Diseases**

The Meeting was informed that the results of the Project studying lung function and air pollution were to be published soon and future studies would be extended to cover people in rural areas.

It was agreed that participants would respond within one month as to their interest in participating in the projects on Determination of Glomerular Filtration Rate and Optimisation of Fractionations of HDR Brachytherapy.

#### **11.3 Computerized Planning in Dosimetry and Treatment of the Cervix (Annex 11)**

Japan reported that the Project had just concluded in 1994 and that their PC-based software developed during the implementation of this Project had been made available in Vienna and expressed the hope that Member States would make use of it.

#### **11.4 The Standardization of I-131 Treatment for Hyperthyroidism** **(Annex 12)**

Japan reported that this Project is a follow-up to the Nuclear Medicine Imaging Programme funded by Japan for a limited number of countries. It was emphasized that there had been no systematic study of the different therapeutic approaches for treatment of hyperthyroidism using iodine-131. The project, through this CRP, would obtain data and analyze the Asian statistics on conventional and small dose iodine-131 therapy. Any effects of ethnic and geographical factors would be noted as well as the most important factors affecting response.

### **12. Projects with TC and CRP Components**

#### **12.1 Nuclear Instrument Maintenance (Annex 13)**

It was reported that the strong emphasis on gamma cameras had continued through 1994. A survey on the technical support by gamma camera manufacturers had been carried out and the results for 213 cameras in five RCA Member States were analyzed. The results were discussed at the Task Group Meeting held in Sydney in October 1994.

The Regional Workshop on the upgrading of analogue gamma cameras using PCs and relevant software had been held in Kota Bharu, 4 to 22 September 1994 and the system had been successfully demonstrated. The software was distributed to every participant. Twenty analogue gamma cameras in the region were now planned to be upgraded.

A Regional Workshop on Quality Assurance in Nuclear Medicine Imaging was held in Bangkok in December and had emphasized the technology transfer in acceptance tests and other QC aspects of assessment and preventive maintenance.

It was noted that some advanced phantoms and test instruments for QC of SPECT systems had been sent to some selected nuclear medicine centres.

Some spare parts had been distributed in response to requests. Mr. El-Saiedi stressed that the next National Coordinators Meeting to be held in Viet Nam in May 1995 should discuss, amongst others, the procurement of parts and resources from within the region.

### **13. New Project Proposals (Annex 14)**

The following new project proposals were submitted for the consideration of the Meeting.

Indonesia proposed a project on the Determination of Glomerular Filtration Rate (GFR) using Nuclear Medicine. All Member States agreed that a month be given to enable the Member States to decide whether there was interest in the proposal.

It was agreed that participants would respond within one month as to their interest in participating in the projects on Determination of Glomerular Filtration Rate and Optimization of Fractionations of HDR Brachytherapy.

On the Background Information on Women, Health and Development, containing a report by the Director General of the World Health Organization (WHO), Australia noted that the current RCA programme embraced specific areas pertaining to women's health issues such as radioimmunoassay for Hepatitis B, cervical cancer treatment, radioimmunoassay (RIA) technique, and tissue banking. RCA National Coordinators were urged to provide the requested statistical data to ensure that the respective Ministries of Health in Member States were informed about these projects. It was pointed out that this would have high impact and low cost and the dissemination of information about the RCA programme in this very important area would be very valuable as a public awareness and public acceptance initiative.

Japan proposed a project on the transfer of technology for the production of  $^{60}\text{Co}$  sources for brachytherapy as a follow-up programme on the previous Project on the Improvement of Cancer Therapy, and this was unanimously accepted.

Malaysia proposed a project on the "Enhancement of the Production and Quality Control of Radioisotopes and Pharmaceuticals". In this regard, the IAEA representative suggested that a more detailed proposal needed to be made to show what the project outputs would be. A revised proposal would be circulated once it became available.

Japan proposed that there should be a mechanism established by which all programme activities within the Medical and Biological classification be reviewed as a whole and coordinated to achieve the most effective performance of the project. Suggestions were made to follow the format employed in the Radiation Protection Project. This proposal was unanimously supported.

**14. Concluding Comments by the Chairperson**

The Chairman thanked the Delegates for their participation in the proceedings of this First Technical Session.

**SECOND TECHNICAL SESSION  
AGRICULTURAL PROJECTS**

Chairman: **Dr. Zaharah Abdul Rahman**  
Associate Professor, Soil Science, UPM

Rapporteurs: **Dr. Norimah Yusof**  
Head, Agricultural and Biological Applications, MINT

**Khairuddin Abdul Rahim**  
Research Officer,  
Agricultural and Biological Applications, MINT

**15. Constitution of the Project Committee**

The Project Committee was constituted with Dr. Zaharah Abdul Rahman in the Chair.

## **16. Technical Cooperation Projects and CRP Components**

### **16.1 Improvement of Nitrogen Fixation and Yield of Grain-Legumes (Annex 15)**

The Meeting was informed that the Project which finished in December 1994, had been funded by the UNDP since 1989 and that ten Member States were involved, namely, Australia, Bangladesh, China, India, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Viet Nam. The activities of the Project had encompassed work on four grain legumes, i.e. groundnuts, mung bean, chickpea and soybean.

At the request of the Chairperson, the Project Coordinator, Dr. Danso, briefly reviewed the programme. He mentioned that, in executing the project,  $^{15}\text{N}$  stable isotopes proved very useful in distinguishing between nitrogen derived from the atmosphere, the soil and fertilizers. The project involved plant breeders as well as soil scientists, especially soil microbiologists. Dr. Danso also pointed out that the close links between researchers in various disciplines enabled the project to be implemented within a short period, with a great success.

The implementation of the Project, which adopted the CRP approach, involved the organization of regular meetings to discuss achievement, the exchange of plant materials and *Rhizobium*, and the provision of consultancy services by regional experts. IAEA support was given in the form of administrative and expert services from the Technical Officer as well as the provision of nitrogen-15 analytical services and training at the IAEA Laboratory in Seibersdorf. Among the achievements recorded to date were: Malaysia's success in producing mutants with high yields and high nitrogen fixation; Thailand's success on *Rhizobium* inoculum production, and Bangladesh's success in obtaining IAEA and government funding for the production of inoculum, based on its achievement in getting good response from the inoculation of legumes. As a result of these achievements, commercial firms have also shown keen interest in commercializing the results.

The Meeting was informed that, as reported by UNDP, the objective of the Programme had been satisfactorily met at the end of the Project.



All Delegates expressed satisfaction on the achievements of the Project and recommended the initiation of a new phase of the project which would highlight the practical applications of nitrogen fixation in cropping systems and in the production of high yielding cultivars. The Delegates suggested that the new phase of the Project could be submitted for funding by UNDP, or the IAEA. Indonesia expressed interest in joining the next phase of the project.

Dr. Danso expressed the willingness, on behalf of the Soil Fertility, Irrigation and Crop Production Section of the FAO/IAEA Division, to coordinate the next programme, which was discussed briefly during the Final Research Contract Meeting at the International Crop Research Institute in the Semi-Arid Tropics (ICRISAT), India in November 1994.

#### 16.2 Public Acceptance and Trade in Irradiated Food (Annex 16)

On request from the Chairperson, Delegates reported the status of food irradiation in the respective Member States. All Delegates agreed that food irradiation was important as one method for food preservation especially suited to the tropics but that the problem of public acceptance had to be resolved. Some Member States reported having government clearance on irradiated food but public acceptance was still low. The Republic of Korea noted that a Seminar on Public Information on Food Irradiation would be held in Korea in 1995. The exact date of the Seminar would be notified to the IAEA in due course.

The Meeting recognized the need to first convince those in authority that irradiated food is safe for consumption, also that such food must be made available to the public to make their own evaluation. There was a need to identify high level marketing people in industry who could assist in developing strategies to publicize the technology to convince consumer associations who shape public opinion and thus promote the acceptance of irradiated foods.

The Meeting also agreed that there be concerted effort among Member States to embark on an effective public acceptance programme in order to transfer the technology.

## **17. New Project Proposals**

There were no new proposals submitted. However, a paper entitled "New Paradigm of Agricultural Research for Sustainable Food Security in the Asia-Pacific Region" was circulated by Mr. Easey, on behalf of the IAEA/FAO Joint Division, for discussion (Annex 17). The Chairperson mentioned that all components of research in agriculture were included in the document and each country programme could be fitted in, including trends towards environmental research. The paper provided some points to be considered in proposing a project, such as the need to identify the customers who could benefit from the project, and to attempt to solve long-term rather than short term problems in agriculture. Mr. Easey suggested that proposals for agricultural projects should include national agricultural institutes which could provide extension services in parallel with project implementation.

## **18. Concluding Comments by the Chairperson**

The Chairperson remarked that the target objective for the project on the Improvement of Nitrogen Fixation and Yield of Grain Legumes, has been satisfactorily met. She hoped that the next phase of the project, as agreed by the Delegates, would be funded and that moves should be made to assess whether UNDP or IAEA Technical Cooperation Funds might be available.

On the Public Acceptance and Trade in Irradiated Food Project, she pointed out there was still the need for some Member States to convince the national authorities to provide clearance for irradiated food, to gain acceptance from food industries and the public, and to have professional marketing experts assist with the promotion of the technology.

## **THIRD TECHNICAL SESSION**

### **RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS**

Chairman:

**Dr. Nahrul Khair Alang Md. Rashid**  
Deputy Director General, MINT

Rapporteurs: **Mr. Jamal Khaer Ibrahim**  
Head, Reactor, MINT

**Dr. Ainul Hayati Daud**  
Senior Research Officer, Planning Unit, MINT

**19. Constitution of Project Committee**

The Project Committee was constituted with Dr. Nahrul Khair in the Chair.

**20. Research Reactor Technical Cooperation Projects**

**20.1 Research Reactor Utilization (Annex 18)**

At the request of the Chairman, Mr. Easey reviewed the briefing materials set out in the Background Documents. He also gave a review of the Project Formulation Meeting held in Taejon, the Republic of Korea, in October 1993.

Mr. Easey outlined the activities planned for 1995, constituting the following:

1. pre-project evaluation mission to review the status of neutron radiography programmes in some of the RCA Member States;
2. a Regional Workshop on Small Angle Neutron Scattering (SANS) to be held at the Bhabha Atomic Research Centre, Bombay, India on 17-28 April 1995; and,
3. regional and fellowship training and expert assistance to promote SANS programmes.

In other discussions, it was noted there was emphasis in many countries for research reactor utilization programmes to be focused on the commercialization of these facilities, such as neutron activation analysis, isotope production, silicon irradiation and neutron radiography. The extension of the work into new materials analysis through SANS and neutron radiography was offering additional possibilities in bringing nuclear technology to a wider group of end users.

The Republic of Korea offered for regional use, the neutron scattering facilities to be installed by 1996 at its new 30MW indigenously-designed and built research reactor.

China outlined past research reactor-based regional activities it has hosted and expressed the hope that such activities, particularly in the area of the development and modification of new materials, be expanded in future with the new research reactor facilities in Indonesia and the Republic of Korea, as well as the construction of the new facility planned in Thailand.

## **21. Energy-based Technical Cooperation Projects (Annex 19)**

At the request of the Chairman, Mr. Easey reviewed the briefing materials set out in the Background Documents. He also gave a review of the Project Formulation Meeting on Energy and Nuclear Power Planning held in Jakarta, Indonesia in July 1993, which recommended major thrusts in the following areas:

1. the maintenance of expertise in the use of the MAED and WASP programmes, and the development of new expertise on the use of the ENPEP programme;
2. a review of input data requirements for the WASP model and measures for their improvement; and,
3. the promotion of effective strategies in nuclear power programme implementation.

These thrust areas were approved by the 16th RCA Working Group Meeting in Bali in March 1994 and the IAEA General Conference in September 1994.

In other discussions, Indonesia noted it had hosted the Project Formulation Meeting in July 1994. The Republic of Korea reaffirmed its commitment to provide cash contribution amounting to US\$ 200,000 as extrabudgetary funding for the project component on the promotion of effective strategies in nuclear power programme implementation, as pledged during the 16th RCA Working Group Meeting in Bali in 1994. In addition, the Republic of Korea offered to host a regional meeting on Effective Strategies in Nuclear Power Programme Implementation in Taejon on 12-15 June 1995, with the cooperation of the IAEA.

Philippines requested clarification on the status of the negotiations for regional workshop planned in Manila in October 1995, as stated in the Background Documents, to which Mr. Easey promised to seek further information from the responsible IAEA Technical Officer. Nevertheless, Philippines expressed a willingness to host the Workshop, if it has been decided, but requested the date to be deferred to 1996, if it were designed as a training event rather than an expert meeting.

Pakistan informed the Meeting of a high level workshop for decision-makers which was supposed to have been in Pakistan, with the cooperation of the IAEA. The Meeting was subsequently cancelled when the IAEA withdrew support. Nevertheless, Pakistan expressed its readiness to host the workshop.

## **22. Nuclear Information System (Annex 20)**

At the request of the Chairman, Mr. Easey reviewed the briefing materials set out in the Background Documents. He also gave a review of the first National Co-ordinators Meeting held in April 1994 in New Delhi, India and the Regional Training Course held in Bombay, India from 22 January to 4 February 1995. Mr. Easey mentioned that organizers of both functions were impressed with the general standard of knowledge of the participants with regard to INIS and information dissemination in general. He said that the next meeting would take place in conjunction with the International Nuclear Information System (INIS) Meeting in Vienna in May 1995.

In other discussions, Australia commented that this Project complements the activities of INIS and that it will continue to participate in the Project.

## **23. New Project Proposals (Annex 21)**

Two new project proposals were presented to the Meeting for consideration.

Indonesia proposed a three-week Regional Training Course on Noise Analysis and Its Applications, for the middle of 1996. The Meeting agreed to defer decision on this proposal until a revised proposal has been appraised by the relevant National Coordinators who would then inform the RCA Co-ordinator.

The Republic of Korea proposed a Regional Training Course on Probabilistic Safety Assessment and Its Industrial and Environmental Applications, to be held in Taejon on 13 October to 3 November 1995. The Meeting agreed to this by consensus. This training course will be funded by the Republic of Korea. Mr. Easey noted that the training course had been included in current plans for the 1995 Training Courses programme since this was part of the regular annual contribution of the Republic of Korea to the RCA programme.

**24. Concluding Comments by the Chairperson**

The Chairman expressed his gratitude to all Delegates for making his task in conducting the discussions an easy one.

**FOURTH TECHNICAL SESSION  
RADIATION PROTECTION PROJECTS**

Chairman: **Mr. Yusof Ismail**  
Director General, LPTA

Rapporteurs: **Mr. Mohd. Yusof Mohd. Ali**  
Head, Health & Radiation Control, MINT

**Ms. Rabiah Abu Hassan**  
Senior Research Officer, Planning Unit, MINT

**25. Constitution of Project Committee**

The Project Committee was constituted with Mr. Yusof Ismail in the Chair.

**26. Technical Cooperation Projects**

**26.1 Strengthening of Radiation Protection Infrastructures (Annex 22)**

At the request of the Chairman, Mr. Easey reviewed the briefing materials in the Background Documents to the Meeting. He also briefed the Meeting on the Expert

Advisory Group Meeting held in Melbourne, Australia, in February 1994, which recommended the following major thrust areas:

1. Off-site emergency;
2. Dosimetry external and internal;
3. Reference Asian Man;
4. Regulations - implementation of ICRP-60 & ICRP-61 Recommendations;  
and
5. Training and education in radiation protection.

Mr. Easey also briefed the Meeting on the National Coordinators Meeting and Mid-term Review Meeting, both held in Kajang, Malaysia on 20-24 March 1995. During the Mid-term Review Meeting, minor adjustments were made to the Project plans agreed to at the Project Formulation Meeting held in Tokai, Japan in 1992. He also informed the Meeting that the Project requirements beyond 1997 had been considered in the overall planning in order to allow a smooth transition between the current project and a new project, which would be proposed later.

It was reported that the next National Coordinators Meeting was planned to be held in Sri Lanka in 1996 and the Project Formulation Meeting for the new Project on Radiation Protection would be held in the Republic of Korea in 1997.

Mr. Easey reminded the delegates that, up until the current project, this area had been mainly financially supported by Australia and Japan who had provided 90% of the funding, and the IAEA the remaining portion. This was a strong indication of Member States' view of the importance of this topic.

Australia endorsed activities on the improvement of radiation protection infrastructure in RCA Member States. The Republic of Korea mentioned their national adoption of the ALARA concept and the accreditation of personnel dosimetry processing into law.

## **27. Coordinated Research Programmes (CRP)**

### **27.1 Compilation of Anatomical, Physiological and Metabolic Characteristics of a Reference Asian Man (Annex 23)**

Mr. Easey reported that the first phase of the CRP on Reference Asian Man had resulted in the accumulation of an extensive database on the anatomical and physical characteristics of the Asian population. It has been recommended that the second phase be focused on a new dimension concentrating on the characterization of dietary intake and trace elements in the body and tissues.

In other discussions, the Philippines supported the establishment of a centralized data collection centre and recommended that these data be included in the ICRP-60 recommendations.

## **28. New Project Proposals (Annex 24)**

There was one new project proposal.

An IAEA Technical Officer had proposed a project on the Storage and Planning for the Disposal of Radioactive Wastes. Bangladesh supported the proposal and believed that this project will benefit all RCA Member States. Australia, while pointing out the great number of IAEA activities in this field, also believed that this project would be beneficial to all RCA Member States. Singapore supported the position of Australia. Sri Lanka also expressed support for the proposal.

Mr. El-Saiedi noted the wide spectrum of coverage for the proposed project and suggested that activities on nuclear power wastes and non-power wastes be separated, and treated separately. He suggested that activities on nuclear power wastes has been adequately covered by the IAEA. He brought the Meetings' attention the Model Project on the topic in the Interregional Programme.

China, Japan, Malaysia, New Zealand, the Republic of Korea, and Viet Nam supported this suggestion on non-power wastes. The Meeting agreed to adopt the proposal, but a Project Formulation Meeting to specifically define the Project to address focused issues was considered essential. The IAEA undertook to circulate further information.



**29. Concluding Comments by the Chairperson**

The Chairman thanked the Delegates for their participation in the proceedings of this Technical Session.

**FIFTH TECHNICAL SESSION  
REGIONAL INDUSTRIAL AND ENVIRONMENTAL PROJECT**

Chairman: **Dr. Ahmad Sobri Haji Hashim**  
Director General, MINT

Rapporteurs: **Dr. Ainul Hayati Daud**  
Senior Research Officer, Planning Unit, MINT

**Dr. Khairul Zaman Dahlan**  
Head, Radiation Processing, MINT

**30. Constitution of the Project Committee**

The Project Committee was constituted with Dr. Ahmad Sobri in the Chair.

**31. Report on the 1994 Activities of the Joint UNDP/RCA/IAEA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development (Annex 25)**

At the request of the Chairman, Dr. Sobri, Mr. Easey briefed the Meeting on the major items of importance that had occurred over the past year. He referred to the materials in the Background Documents:

Extract from the Report of National Co-ordinators Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Lucas Heights, 28-29 April 1994.

Extract from the Report of the Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Sydney, 3 May 1994.

Extract from the Report of the Tripartite Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Vienna, 24 September 1994.

Fax to Mr. Willi Scholl on "Implementation of Recommendations from Tripartite Review Meeting", RAS/92/073, 23 November 1994.

Fax from Mr. S. Zacharia on UNDP budget cuts, 30 November 1994.

Fax to RCA Co-ordinators:

- technician training
- promotion and awareness
- changes to programme

and the additional documentation he prepared for the Delegates on their arrival:

Extract from the Mid-Term Review Mission for the joint project carried out 26 February to 17 March 1995.

Notes on the Mid-Term Review (RAS/92/073).

Extracts from the National Co-ordinators Meeting on:

- Radiation Technology;
- Nucleonic Control Systems and Tracer Technology; and
- Nuclear Analytical Techniques.

"Keeping Pace with Change in the Regional Co-operative Agreement (RCA) for Asia and the Pacific" paper presented to UNDP RDC.

"Notes on RCA Experience of ICP-5" Paper presented to UNDP RDC.

He reviewed the changes in project activities that had followed the Tripartite Review Meeting and the adoption of the additional efforts in promotion and public acceptance and technician training into the work programme for 1995 and 1996. He then set out the effects of the UNDP budget cuts on the programmes for 1994, 1995 and 1996, noting that the effective loss of funds was at least US\$400,000 more than the budget cuts because of the added responsibilities taken on with the acceptance of the TPRM recommendations.

He referred to the reports from the three National Co-ordinators Meetings on Radiation Technology, NCS and Tracers and Nuclear Analytical Techniques and noted that all reported good progress with most regional training aspects completed. The remaining efforts would be largely directed at national events ensuring sustainability and assisting weaker Member States.

Concerning the Mid-Term Review mission report for RAS/92/073, he referred the delegates to the extract circulated to them and his comments on each of the points in the "Findings and Recommendations" in an accompanying document.

In conclusion he briefed the Meeting on the main points of importance being raised at the UNDP Regional Development Co-operation Meeting that he had been attending. He noted that the UNDP response to the appeal for restoration of the original budget for RAS/92/073, had been to firmly continue with their position that nothing would change until the result of the June Executive Board Meeting was known. He also advised the Meeting of actions he had taken to try to promote the effectiveness of the RCA in achieving a workable regional co-operation environment.

As regards the Mid-Term Review Mission Report for the Project, the Meeting endorsed the action of Mr. Easey, the RCA Coordinator, for the strong arguments he presented at the concurrent UNDP Meeting, also held in Kuala Lumpur. The Meeting also endorsed the papers entitled "Keeping Pace With Change - The Regional Cooperative Agreement for Asia and the Pacific", and "Notes on RCA experiences of ICP-5" submitted by the RCA Coordinator to the same UNDP meeting.

In addition the Member States, requested the RCA Coordinator to draft a paper to be submitted to the UNDP, drawing together the arguments in support of maintaining the UNDP-funding for the Project and that this should be discussed at the UNDP National Counterparts Meeting to be held in Wellington, New Zealand, on 10 - 14 July 1995.

The Meeting expressed strong concern at certain aspects of the report of the Mid-Term Review Mission of the UNDP Project and noted that all Member States were invited to submit detailed comments on the Report to the RCA by 17 April 1995, on an item-by-item basis. New Zealand requested that Member States urgently pursue this matter with their respective UNDP Counterparts.

In further discussion, Mr. Easey suggested that more emphasis was needed at all levels to promote the achievements and outputs of the Project. The Meeting expressed appreciation for Mr. Easey's support to the UNDP/RCA/IAEA Project.

The Chairman invited, Mr. Pham Duy Hien, Chief Technical Officer for the Project, to brief the Meeting on the implementation of the Project in 1994. He summarized the major activities and confidently concluded that there would be significant developments resulting from the Project activities. This was based on reports from the National Coordinators at the various National Coordinators Meetings, the End-of-Mission Reports of short and long-term experts, and taking into consideration the recent Mid-term Review Report. There was certainly an overall increase in the applications of isotope and radiation technology within Member States. The full text of the report is given in Annex 25.

Mr. Hien also reported that in 1994 13 regional training events (RTEs) were organized involving 206 participants. In addition, 62 expert missions were arranged and, the Chief Technical Officer along with the two long-term experts were appointed during the year.

In his assessment of impact, it was noted that radiation technology, in particular, has been successfully commercialized in the RCA Member States and a number of electron accelerators and electron beam processing facilities were installed and operating. The applications of non-destructive testing (NDT) has also expanded in the past years and National Tracer Groups (NTGs) were becoming well established.

On the question of the suitability of participants attending RTEs, he recommended that Member States should further improve their procedures for selecting these candidates. He suggested the further improvement of the performance of the RTEs through the provision of adequate time to include practical sessions, discussions, and report presentation by participants of related working experiences. He also recommended that a "low key" assessment of participants be included before and immediately after the course. This would be used to gauge the performance and effectiveness of the training.

Mr. Easey agreed with the findings of the Chief Technical Officer.

### **32. New Project Proposals (Annex 26)**

There was one new project proposal.

The proposal for a Regional Asian Project on Marine Contamination and Transport Phenomena, prepared by a IAEA Technical Officer in consultation with some RCA Regional Project Coordinators, was submitted for the consideration of the Meeting. It was noted that all Member States with the exception of Mongolia, had extensive coast lines. Australia said that the recent IAEA Regional Training Course on Applied Marine Radioactivity had been hosted jointly by ANSTO and the Australian Institute of Marine Studies (AIMS) and had been well received. This RTC had made contribution to this topic. In the discussions, it was noted that it would be a very costly proposal if the full costs of providing ships time had to be included. Since a number of Member States had their own national research vessels, there was a possibility that these could be made available as 'in-kind' contributions to bring the project budget to acceptable levels. Member States were asked to investigate the feasibility of such a proposal.

All Member States supported the proposal. Australia and Japan suggested they would be considering providing financial support. All Member States were requested to provide comments by 1 June after which a Project Formulation Meeting would be planned to give a greater regional input to the final project design. It was noted that the marine environment was very likely to be a priority area for UNDP and other donors in the future.

The Republic of Korea recorded that the use of "Sea of Japan" or "Japan Sea" for the sea lying between Korea and Japan by the IAEA is neither appropriate nor reasonable. This is because in Korea, the same sea has been named "*Tong Hae*" which is translated as "East Sea" over several centuries.

### **33. Concluding Comments by the Chairperson**

In his concluding remarks, the Chairman reminded Member States to submit detailed and specific comments on the Mid-Term Review Mission Report for the Project by 17 April 1995. The RCA Coordinator was requested to note these detailed comments by the Member States, in addition to his observations, in making his arguments for the continued funding of the Project by the UNDP.

## **COUNTRY STATEMENTS**

### **34. Receipt of Country Statements.**

Country Statements were received and reproduced as Annexes 27 to 42.

## **SECOND ADMINISTRATIVE SESSION**

The Second Administrative Session was convened with Dr. Ahmad Sobri in the Chair.

### **35. RCA Action Plan for 1995 (Annex 43)**

Mr. Easey reviewed the briefing materials set out in the Background Documents.

He recorded his thanks to the Republic of Korea for their pledge to financially support the implementation of the footnote a/ project on "Effective Strategies in Nuclear Power Programme Implementation" (RAS/0/021). In response to queries raised by Indonesia, Japan informed that funds had already been pledged for 1995 and that allocations of funds for the Reference Asian Man Project would be made available.

China pledged to financially support the joint UNDP/RCA/IAEA Project with US\$50,000 cash each year.

The Meeting noted the decrease in funding from the UNDP and a possible need to segment the project into the highest priority activities which would be funded from the remaining UNDP funds while the remainder would be put as footnote a/. The final decision on the structure of the RCA Action Plan would be determined as an eventual outcome of the UNDP's decisions on the funding for the remainder of the project, most probably at the National UNDP Counterparts Meeting in Wellington in July.

In conclusion, the Meeting agreed to Australia's suggestion that, despite funding difficulties, the RCA Member States should move forward positively with enhanced cooperation between Member States.

The Meeting endorsed the RCA Action Plan for 1995.

**36. RCA Cost Projections 1995 - 1996 (Annex 44).**

Discussions on this item were merged with those on the RCA Action Plan. The budget and budget estimates for 1995 were approved. The uncertainty of the UNDP contribution was acknowledged.

**37. Other Business**

**37.1 Role of the RCA Chairman**

Australia expressed hesitancy about the need to expand the role of the RCA Chairman beyond the agreed traditional role of Chairing the two meetings and this opinion was supported by the other Member States.

**37.2 Role of the RCA Coordinator**

The Meeting agreed that the role of the RCA Coordinator should be maintained at its present level and that there should be a smooth transition from the current RCA Coordinator to his successor at the end of 1995 when the post is vacated.

**37.3 Project Formulation Meeting and National Coordinators Meeting**

It was unanimously agreed that the present arrangements for Project Formulation and National Coordinators Meetings were instrumental in giving clear goals and objectives for the development, monitoring and assessment of the RCA Project activities and should continue.

Australia said that it was important for all the projects to have clear objectives, milestones and impact. It was also desirable to have the cash flow projected in the budget. Mr. El-Saiedi commented that this would be the trend for future TC project design and would be brought in for the 1997-98 biennium. Mr. Easey referred to the Regional Workshop on Project Design, Management and Evaluation of IAEA Technical Co-operation Projects in the Asia Pacific Region which had been held in Kuala Lumpur,

31 January to 9 February 1994 and had been attended by most TC liaison officers from RCA Member States, who would be able to inform the RCA National Co-ordinators on the specific details.

#### 37.4 Mechanisms of Technology Transfer to Non-RCA Members in the Region

Mr. Easey said that he had been approached concerning the possibility of non-RCA Member States participating in relevant RCA projects especially training activities. He highlighted the existing precedents under the RCA Programme, especially in training, for assisting non-RCA Member States. The principal conditions were that:

1. there would be no cost to the RCA;
2. there was no disadvantage for the participation of any RCA Member State;
3. the permission of the host Government had to be obtained.

Australia noted that the IAEA Board was specifically addressing this type of problem at the moment. The Meeting agreed that the existing arrangements were acceptable but that any formal decision should await the outcome of the Board since there should not be conflict with the Board of Governors' decision.

#### 37.5 DECADES Programme (Annex 45)

Mr. Easey referred to the incoming fax from Vienna concerning the possibilities for arranging a Regional Workshop on DECADES under RCA in 1996. He pointed out that there was already a 6 week RTC on ENPEP scheduled for 1996 which would include DECADES and did not see any advantage for RCA Member States in altering this programme. There was unanimously agreed by the Meeting.



### 37.6 Organizational Matters

The Meeting noted its appreciation of the essential role played on its behalf by the RCA Coordinator at the concurrent UNDP Meeting on Regional Cooperation in the Asia and Pacific Region in Kuala Lumpur. However, the Meeting also strongly requested that better communication between and within organizations ensure that the RCA Coordinator can always participate fully in the Annual RCA General Conference and Working Group Meetings.

Bangladesh indicated the possibility of hosting the 1996 Eighteenth RCA Working Group Meeting in Dhaka.

### 37.7 Factual paper on RCA for presentation at the 1995 NPT Review and Extension Conference

Australia, on behalf of Bangladesh, China, Indonesia, Japan, Malaysia, Mongolia, New Zealand, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand and Viet Nam, brought to the attention of the Meeting the factual paper on the activities of the RCA, accepted at the 23rd General Conference Meeting of the Representatives of RCA Member States for presentation at the 1995 NPT Review and Extension Conference, which highlighted the manner in which the RCA has been and continues to be an important vehicle for promoting cooperation and collaboration in the peaceful uses of nuclear science and technology in the Asia Pacific region.

It was also pointed out that the Nuclear Non-Proliferation Treaty (NPT) represented a crucial component of the Asia-Pacific security framework. It provided an essential assurance that the Region would be free of nuclear proliferation and thereby assisted in underpinning the Region's economic growth. The framework for cooperation provided by the NPT, particularly the derived assurance about peaceful use, played a key role in underpinning regional nuclear cooperation and trade, as well as trade and cooperation with countries outside the Region.

Pakistan requested to have recorded its disagreement with the inclusion of the above comments on NPT in the Seventeenth RCA Working Group Meeting Report.

### 37.8 Other matters

Philippines requested that all National Nuclear Research Institutes in RCA swap their Annual Reports. This was supported by the delegates.

## **CLOSING SESSION**

### **38. Acceptance of Draft Documents**

The first draft report was distributed to the Delegates and was reviewed on a page-by-page, line-by-line basis. The draft report was accepted subject to some additional editorial work.

The RCA Co-ordinator said that he would distribute the draft report at the earliest opportunity and requested that all corrections should be notified to him by 1 June to allow timely production and distribution of the final report.

### **39. Closing Remarks**

#### 39.1 IAEA

The RCA Co-ordinator thanked the participants for their assistance in dealing with a very full and difficult programme. He said that he was pleased with the outcome and that there had been significant net benefits in his attendance at both the UNDP RDC and the WGM.

He thanked the Malaysian Government for hosting the Meeting and MINT for their hospitality and strong support of all aspects of the conduct of the Meeting.

Mr. El-Saiedi endorsed these comments and mentioned his personal appreciation of being able to be present. He thanked Dr. Sobri for his Chairmanship and all the Chairpersons of the Technical Sessions.

### 39.2 MINT

Dr. Sobri briefly reviewed the achievements of the Meeting and the large number of matters that had been dealt with. He said that the UNDP funding problems were very serious and they would inevitably have an impact on how the joint UNDP/RCA/IAEA project would be completed. He asked all Member States to do their utmost to ensure the continued viability of the RCA programme and the strong collaboration and co-operation between them. In conclusion he said that the programme continued to be vigorous and relevant to the needs of Member States and that this momentum would overcome any temporary set backs being currently experienced.

### 40. Official Closing

Dr Sobri thanked everyone for their contribution to making the Meeting such a success. He said it had been an honour for MINT and Malaysia to host the event. He wished everyone a safe journey home and declared the Meeting closed.



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**THE SEVENTEENTH RCA WORKING GROUP MEETING**

**Kuala Lumpur, Malaysia, 27 - 30 March 1995**

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**WELCOME REMARKS OF Y BHG DR. AHMAD SOBRI HAJI HASHIM,**  
**DIRECTOR GENERAL, MALAYSIAN INSTITUTE FOR NUCLEAR**  
**TECHNOLOGY RESEARCH (MINT)**  
**AT THE OPENING CEREMONY OF THE 17TH RCA**  
**WORKING GROUP MEETING**

**KUALA LUMPUR, MALAYSIA, 27-30 MARCH 1995**

Mr. Chairman;

The Hon. Mr. Law Hiung Ding, Minister of Science , Technology and the Environment  
Malaysia;

Mr. Ali F. El-Saiedi, Director, Technical Cooperation Implementation Division of the  
International Atomic Energy Agency (IAEA);

Mr. John Easey, RCA Coordinator;

Distinguished RCA Colleagues;

Honored Guests;

Ladies and Gentlemen,

On behalf of the organizing committee and the Malaysian Institute for Nuclear  
Technology Research (MINT), May I extend my sincere welcome to the delegates of  
the seventeenth RCA Working Group Meeting.

Within the space of two weeks, we observe a succession of three meetings  
directly related to the RCA in Malaysia. This particular RCA Working Group Meeting  
succeeds the National Coordinators Meeting and Mid-Term Review for the RCA  
project on Radiation Protection Infrastructure held last week, on the 20th - 24th March.  
Finally, the Terminal Tripartite Review Meeting for the UNDP-funded project on  
Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes will  
be held on the 31st March. For a number of the delegates, you would have attended  
all these Meetings and I thank all of you for your kind participation and your patience.

This is the second time for Malaysia to be the host of this auspicious annual Meeting of the RCA Working Group, the first was in 1982. Much have changed within that period. At the fourth RCA Working Group Meeting we were known as the UTN ISMAIL Atomic Energy Research Centre (PUSPATI) under the Ministry of Science, Technology and the Environment. PUSPATI was later renamed the Nuclear Energy Unit (UTN) in June 1983 on being placed under the auspices of the Prime Minister's Department. In October 1990, UTN was returned to the Ministry of Science, Technology and the Environment and assumed its new identity on 10 August last year and it is now known as the Malaysian Institute for Nuclear Technology research and acronymed MINT.

Ladies and Gentlemen.

It was seen that this new name, MINT, clearly projects our institute as R&D organization with its core activity centered around non-power nuclear technology products and services that are targeted to the major economic sectors, namely industry, medicine, and agriculture. This is clearly reflected in our restated mission of enhancing national development and economic competitiveness through excellence on nuclear and related technologies.

Our activities are funded by a combination of public funds internally generated revenue and whenever possible, interlaced with international and bilateral technical assistance programs.

The government of Malaysia funds are sourced from operational and development budget allocations and bid financing of R&D projects through the IRPA or the Intensification of Research in Priority Areas Program coordinated by the Ministry of Science, Technology and the Environment.

In the current sixth Malaysia Plan that spans the period of 1991 to 1995, twenty-three R&D programs were conducted under the IRPA-funding mechanism: ten in the industrial sector, one in medicine, nine in strategic areas, and three in agriculture.

Another important source of funding is MINT's own trust fund which holds revenue obtained through its business activities. The trust fund is increasingly making a significant contribution to the financing of MINT's activities.

The IAEA funding comes in the form of technical assistance programs or the Regional Cooperation Agreement (RCA) program and research contract funding. These are complemented by assistance of foreign governments notably Japan and Australia through bilateral arrangements.

Current lateral relations with Japan are the STA Scientist Exchange Program on Nuclear Science & Technology and collaborative project agreement between MINT and Japan Atomic Energy Research Institute (JAERI). Another collaborative project agreement, MINT - Japan International Cooperation Agency (JICA) on "Radiation Applications Project" came to a successful completion just last year. Another bilateral assistance program which is about to end this year is the Australia - Malaysia nuclear technical cooperation project.

In addition to existing multilateral and bilateral arrangements, the International Nuclear Co-operation In Asia (INCIA) is also becoming a significant source of technology transfer. It provides an important forum for the exchange of information and experiences between nuclear scientists and technologists in the region.

Ladies and Gentlemen,

While funding is one of the important components for successful implementation of any project, a successful project is of little meaning without the result being used by anyone. We are very sensitive to this aspect of research management, the most of our R&D activities are today geared towards solving problems and making to end-users processes and products more competitive. To ensure such will be case project proposals are vetted with one of the criteria being the availability of end-users. We are pleased to note that all RCA projects we are involved with have benefited us.

To date, three joint venture projects through memorandum of understanding or transfer agreement have been concluded with the private sectors. Several others are now being negotiated. The services offered by MINT are currently subscribed by almost 800 users, 90% of which come from the private sector. The increasing trend of the demand for specialized technique using nuclear technology that almost emulates the rapid progress of the nation brings us a happy note for an increased contribution of nuclear technology in the main sectors of national and economic developments.

Ladies and Gentlemen,

In the tentative agenda we have before us, four days are allocated for the meeting, of which three are set for RCA Member States to deliberate over issues related to on-going RCA activities. The third day was set aside for the secretariat to prepare and compile report of the meeting. On that day too, we have arranged for the delegates to make a working visit to the city of Melaka. I hope you all take this opportunity to relish some of the other interesting facets of Malaysia. To accompanying spouses, you are also invited to participate in the visit.

As honored guests to the seventeenth RCA Working Group Meeting here in Kuala Lumpur, we are please to make your stay here pleasant. Please do not hesitate to contact any member of the secretariat should you require any assistance whatsoever.

May I also take this opportunity to express my sincere gratitude to all members of the secretariat, who, over the last few weeks, has been putting their best efforts to make this meeting a successful one.

Finally, I wish you an enjoyable stay and I look forward to a successful meeting.

Thank you.





**SEVENTEENTH RCA WORKING GROUP MEETING**

**KUALA LUMPUR, MALAYSIA**

**27-30 MARCH 1995**

**ADDRESS OF WELCOME**

**by**

**ALI F. EL-SAIEDI,**

**DIRECTOR, TECHNICAL CO-OPERATION IMPLEMENTATION**

Distinguished Delegates, Colleagues, Ladies and Gentlemen,

On behalf of the Director General, Dr. Hans Blix, it gives me great pleasure to welcome you to the Seventeenth Working Group Meeting of RCA Member States.

The IAEA presents its compliments to the Government of Malaysia and expresses its gratitude for agreeing to host this Working Group Meeting. I am very pleased to see that our newest Member State, New Zealand, is represented here at its first Working Group Meeting as a Member State.

Mr. Qian has asked me to convey his greetings to you and his wishes for a successful meeting. This year he gave me the opportunity of being with you, as in the capacity of my office and personally, I am much concerned with the RCA programme. Likewise, the Director of Technical Co-operation Programming Division will attend the next meeting. This rotation of attendance will permit the higher management of the department to benefit from closer insight, stronger involvement in and added exposure to the activities carried out under the framework of this important regional co-operative agreement.

The past year has seen a continuation of a strong programme of activities in RCA. There were 15 Technical Co-operation Projects, four having associated Co-ordinated Research Projects and one additional Co-ordinated Research Project not associated with a TC project. Twenty two major events and meeting were held during the year, involving 372 participants. There were a total of 23 Regional Training events

carried out under the RCA and Regional Programme, which gave training opportunities to 403 participants, and 282 expert assignments were implemented at the request of the Member States. This level of activity will be making impacts on the national programmes and the country plans for these areas of nuclear technology.

However, in a recent fax to Mr. Qian on the subject of UNDP's major Mid-Term Review of All Regional Programmes in Asia and the Pacific Region, it was said that the organization's Executive Board was not impressed by mere numbers as an indicator for a successful programme. Impact was of major concern. As you well know, the Agency too is very concerned with impact and it is Member States who are in the best position to provide information on the areas where strong impact is being achieved. Therefore, feedback and illustrations of these results are very important in furthering the profile and future continuity of our programme. Your own actions in this regard will be very persuasive and certainly will be instrumental in setting up dialogue for the RCA programme with other donor organizations.

Also, in the same fax, several messages were transmitted. One of these was that governments were not fully conversant with the nature of regional programmes and the impact that they are making to the development process in their own countries. Another - was that some government appear to feel that many interventions are too basic in nature to their current circumstances. Further, the lack of adequate communication, the limited participation by Member States, their experts and institutes and insufficient dissemination of information were criticized and emphasis was placed on the necessity that activities need to focus on areas where increasingly sophisticated capacities in the region are enabled to move upstream through the interventions of regional programmes.

In order to fulfill the Agency's obligations to carry out a Mid-Term Review for the joint UNDP/RCA/IAEA project, a review mission was undertaken in February/March of this year. It is worth noting that some concerns raised in the UNDP fax have been echoed in the review mission's report on the joint project. You should all by now have received a copy of this report for discussion at this Meeting.

The Mid-Term Review of the Joint project gave you the opportunity as programme managers to assess what has been accomplished so far and, equally important, the continuing relevance of the project's activities to regional development. All countries were requested to submit their report according to the same terms of reference as those countries actually visited by the review team. Your cooperation was sought on this to ensure that the review could accurately reflect the comments of all RCA Member States. I would like to note here that a large majority of Member States did respond to this request and all country statements are annexed to the full mission report.

What is clear from the report is that there has been a general and high level of absorption of those technologies considered relevant to the national development by RCA Member States. There is also a distinct message that management structures need to be more interactive to enable development initiatives to create regional impact. One of the challenges that now faces this meeting is to address the issues raised in this report and in particular, that of regional sustainability.

One way to meet this challenge was outlined at the RCA General Conference Meeting in September 1993. At that time, Member States were informed about a TC project being set up to enable the AFRA, ARCAL and RCA programmes to work together more. This project has the objectives to facilitate the exchange of experiences between the three regional programmes. As is noted in the project write up, the three Regional Co-operative Agreements have been successfully carrying out technical co-operation projects with the aim of establishing self-sufficiency in the applications of nuclear technologies in fields such as industry, health, hydrology and agriculture. The projects emphasize the transfer of technology from the most advanced countries in the three regions to the less advanced ones within the spirit of Technical Co-operation between Developing Countries (TCDC).

The basic idea for this came from the September 1993 meeting of representatives of the three Regional Agreements held in Vienna which exchanged accumulated experiences regarding the involvement of the end users and management strategies to accomplish the transfer. The Secretariat proposed to strengthen the management of these Agreements by providing the means for intense upstream activities in order to achieve high quality programmes.

Under the project each agreement can provide cost-free advisers to identify opportunities for good projects and possible funding sources. The travel within the region will be sponsored by the Agency.

AFRA Member States have already held a Field Management Review Meeting to define concrete measures to further strengthen the role of the Chairperson and to define the terms of reference for the advisers. The upcoming Working Group Meeting of ARCAL will discuss suggestions proposed on this issue and Member States will be given the opportunity to discuss the relevance to their programme. I am confident that you have also come to this meeting, fully prepared to discuss the strengthening of the field management of the RCA programme.

At last year's Working Group Meeting in Bali the recommendations included: Support for seven new projects and the incorporation of initiatives that would contribute to the UN Women in Development Programme. Five of the projects were subsequently approved by the General Conference Meeting as was the WID initiative. A notable feature of both Meetings, was the positive attitude of Member States towards assuming a greater role in the financing of the RCA programme. By the General Conference Meeting 10 Member States had indicated financial contributions for the 1995 programme amounting to some \$1.25 million.

All delegations will be extremely concerned by the very dramatic changes that have occurred with regard to the UNDP funding for the joint UNDP/RCA/IAEA project. The position is extremely serious, with UNDP currently pressing to cease its contribution by the end of this year.

It is indeed very timely that RCA Member States have made decisions to support projects through cash donations. In the light of the UNDP funding crisis, all Member States should examine very seriously the possibilities of either beginning to make extrabudgetary donations or to increase the amounts being transferred to the Agency. It would be good to see the number of cash donors now increase from the ten Member States, who have already indicated their commitment to make funds available at the last General Conference Meeting. Contributions have already been received from Australia, Indonesia, Japan, Malaysia and Philippines and, hopefully, other countries will follow soon and honour their pledges. There are other approaches that warrant consideration. For example, Member States might consider whether they ought to make approaches to funding bodies for support of the RCA programme. This aspect certainly should be examined more closely during our discussions.

This approach might also be valuable when proposals for new projects are being considered. In times of tight budgets worldwide, Member States should focus on projects that are really good and consequently do attract funding. I think you will agree that it is important to identify proposals which will positively influence donors.

Looking at the Agenda for the next five days, the project Committee's reviews of the five technical areas will provide a direct feedback on Member States' reaction to last year's activities in all of the projects and their needs and expectations for the future. Such immediate and direct analysis is invaluable in allowing the Agency to really gauge the appropriateness of the projects particularly taking into consideration the findings of the Mid-Term Review report. It is to be hoped that all Member States will feel free to offer their unreserved opinions on all aspects.

In conclusion Mr. Chairman, I look forward to hearing the views of the distinguished delegates on the agenda items and I also look forward to having contacts and discussions outside of the formal sessions of this meeting. I know this will provide me with a wealth of helpful feedback for both, the RCA and the TC programmes.

Thank you,



**SPEECH BY THE HON. DATUK LAW HIENG DING  
MINISTER OF SCIENCE, TECHNOLOGY & THE ENVIRONMENT  
MALAYSIA**

**AT THE OPENING CEREMONY OF THE 17TH RCA  
WORKING GROUP MEETING**

**HOTEL CROWN PRINCESS  
KUALA LUMPUR, MALAYSIA  
27 MARCH 1995**

Mr. Ali F. El-Saiedi, Director, Technical Cooperation Implementation Division of the International Atomic Energy Agency (IAEA);

Y.Bhg. Dr. Ahmad Sobri Haji Hashim, Director General, Malaysian Institute for Nuclear Technology Research (MINT);

Distinguished RCA Delegates;

Honoured Guests;

Ladies and Gentlemen.

On behalf of the government of Malaysia, I would like to express our gratitude to the RCA Member States and the IAEA for kindly agreeing to have the Seventeenth RCA Working Group Meeting in Kuala Lumpur. This is indeed an honour for Malaysia and for those of you who are here for the first time an opportunity for you to see our country and enjoy a token of our hospitality.

Ladies and Gentlemen,

It has been nearly thirteen years since Kuala Lumpur last hosted the RCA Working Group meeting and at that time in 1982, it was my former colleague, the former Minister of Science, Technology and the Environment, Y. Bhg. Tan Sri Ong Kee Hui who officiated the meeting.

I was informed that in 1982, the member states party to the Agreement were Australia, Bangladesh, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka and Thailand and to these delegations, I wish them "Welcome Back to Malaysia". To our colleagues who were not represented at that time namely from New Zealand, an observer State then and to the other later Member States- Mongolia, Myanmar and Vietnam, I wish all of you a very warm welcome to your first RCA Working Group Meeting in Malaysia.

It is widely acknowledged that the International Atomic Energy Agency through RCA has established greater understanding and cooperation with the region. May I congratulate the agency and in particular the Department of Technical Cooperation for having succeeded in encouraging and assisting Member States in the research, development and application of atomic energy for peaceful purposes through Regional Cooperation. The RCA programme has promoted the efficient use of available resources for the development and the utilization of nuclear technology in a wide range of areas in the region to tackle regional concerns. More importantly, the RCA for the Asia and Pacific region has been a model to other regional programmes such as ARCAL for Latin America and AFRA for Africa.

The Government of Malaysia express its satisfaction with the steady progress made in this regional cooperation. It is our hope that within the next few days, we, as member countries will be able to exchange our views and information as to how to further enhance on-going areas of cooperation and, more broadly, to further discuss issues relating to the development and peaceful utilization of nuclear technology. Thus, efforts to promote better understanding and cooperation will be intensified in the region.

Unique to regional programmes for the IAEA, some Member States are now beginning to contribute to the funding of activities under the UNDP/RCA/IAEA Project for Asia and the Pacific on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development. This provides clear evidence of the recognition accorded by Member States to the impact that this



Project has had on national development, and of their commitment to ensure continued sustainability of the Project. In this present cycle, Malaysia contributes a modest sum of US\$50,000 to this project and was the first non-traditional Member State to do so besides the traditional donors namely Japan and Australia.

Ladies and Gentlemen,

As you are well aware, in Malaysia, the Malaysian Institute for Nuclear Technology Research (MINT) under the Ministry of Science, Technology and the Environment was entrusted with the responsibility of introducing and promoting the use of nuclear science and technology in national development.

Integral with its other activities, MINT is also entrusted with the main task of implementing the Malaysian components of RCA projects. To support its activities, MINT is financed by a combination of public funds, internally-generated revenue and, to a lesser extent, international and bilateral technical assistance. The Government of Malaysia provides funds in the form of Operational and Development Budget allocations as well as through bid financing of R&D project under our Intensification of Research in Priority Areas, Programme, in short IRPA.

In some cases, technology sourced through the RCA framework are repackaged and integrated with technology sourced elsewhere in order to achieve the desired benefits. These, we are proud to say, are successfully being transferred to the industrial sector and to other research institute. These refined technological known-how, founded on technology sourced through the RCA, and their subsequent transfer to Malaysian industries, have contributed to the further strengthening of national infrastructure.

Ladies and Gentlemen,

I have also been informed that the UNDP, having carried out a major Mid-Term Review of Inter-Country Projects in the region, has accounted inter alia that participating Governments were reported to be not fully conversant with the nature of

UNDP-funded regional programmes and the impact that these projects have on the development processes in their respective countries. Further, it was reported that some Governments appear to feel that many of the interventions are too basic in nature to their current circumstances. It was also indicated that there are large gaps in information and communication and that most studies carried out so far under these programmes are not published, resulting in their not being available to a wider circle. These are certainly serious implications and Malaysia does not deny that they may be some truth in it.

The Asia Pacific region is undergoing rapid economic expansion with several RCA Member States experiencing average annual growths of eight to ten percent over the past decade. Therefore, for an inter-country programme involving Member States in varying stages of development such as in this region, these findings of the UNDP report are to be expected.

At the very outset of this RCA programme, identifying and reaching consensus on areas for regional cooperation seemed a monumental task. Understandably, each Member State has different sets of national priorities and concerns. Even when areas of cooperation have been identified, individual national socio-economic realities demand differing levels of commitment of national resources to support RCA activities.

For the least developed Member States, the UNDP/RCA/IAEA project funding is substantial by national standards and may, at times, be the only form of funding for the project. In more developed Member States, this funding is complementary in nature while in the most developed Member States, UNDP project funding are rather diluted, when compared with national funding, for it to have any measurable effect. This complicates any region-wide measurement of indicators to assess the direct effect of the activities in the region. With limited resources and taking other factors into consideration, it is therefore not surprising that measured output for the activities are limited to figures on the number of seminars, training courses and workshops held and the number of personnel trained.

Nevertheless, Malaysia stands by the RCA in all the decisions reached thus far but further efforts must be undertaken to address the findings of the Mid-Term Review report of the UNDP. I have full confidence that the respective Delegations at this Meeting will succeed in finding solutions to overcome the problem before us.

On the question of sustaining future UNDP funding to the RCA, it is worth considering an approach which incorporates UNDP-funded inter-country programmes with individual UNDP country programmes. While country programmes are tailored to meet the respective national needs and that UNDP priority is given to the least developed Member States, other more developed Member States may participate in a regional effort to assist lesser developed neighbours. Funding may be in the form of research contracts offered to the Member States in the region. Such a framework of multi-tiered regional cooperation, will hopefully create a greater, more measurable impact too the region.

For future activities, Malaysia's concerns will mainly be on issues pertaining to the quality of the environment as well as to the disposal and storage of industrial wastes, both radioactive and non-radioactive. As the Minister responsible for the environment, I wish to appeal to the RCA to consider including activities focussing on the applications of nuclear science and technology in tackling environmental degradation.

Ladies and Gentlemen,

On a less serious note, you will be enlightened to know that the organizers have arranged a working visit to the historical State of Malacca, a state situated about 200 kilometers south of Kuala Lumpur. In the fourteenth century, Malacca was a thriving port and a centre of international trade in this part of the world. In the early part of the fifteenth century, it was colonized by the Portuguese, followed by the Dutch and finally the British. All of you will be Guests of the Malacca State Government and for this, I would like to officially record my appreciation to the State Government of Malacca for their generous hospitality. I hope all of you will enjoy this visit.

Ladies and Gentlemen.

In conclusion, I would like to express my sincere thanks to our RCA colleagues who I am sure, will make tremendous efforts in ensuring the success of this Meeting. It is hoped that the various Sessions in the next few days will point to a more sound future and direction for the Regional Cooperative Agreement. The Meeting may be assured that Malaysia will render its utmost support in making the RCA a success.

Having said that, it is with pleasure that I declare this Seventeenth RCA Working Group Meeting in Kuala Lumpur open.

Thank you for your kind attention.

**REVISED AGENDA**

**SEVENTEENTH RCA WORKING GROUP MEETING  
KUALA LUMPUR, MALAYSIA, 27-30 MARCH 1995**

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**MONDAY, 27 MARCH 1995**

**0830 - 0900      REGISTRATION**

**0900 - 1015      INAUGURAL SESSION**

1. Welcoming Address by Dr. Ahmad Sobri bin Hj. Hashim, the Director General of Malaysian Institute for Nuclear Technology Research (MINT),
2. Welcoming Remarks by the Mr. Ali F. El-Saiedi, Director of Technical Co-operation Implementation Division, International Atomic Energy Agency (IAEA)
3. Official Opening by Hon. Datuk Law Hieng Ding , the Minister of Science, Technology and the Environment on behalf of the Government of Malaysia

**1015 - 1030      Coffee Break**

**1030 - 1230      FIRST ADMINISTRATIVE SESSION**

4. Election of Chairman and Comments by Chairman-elect
5. Adoption of Agenda
6. Draft RCA Annual Report, 1994
7. Election of Chairpersons of Project Committees (Article VI of Agreement Refers)
  - a. Medical & Biological Applications of Nuclear Techniques
  - b. Agricultural Projects
  - c. Research Reactor, Energy Based & General Projects
  - d. Radiation Protection Projects
8. Policy Review Seminar

**1230 - 1400      Lunch**

1400 - 1515      **FIRST TECHNICAL SESSION**

**Medical and Biological Applications of Nuclear Techniques**

9. Constitution of Project Committee
10. Technical Co-operation (TC) Projects
  - 10.1 "Radioimmunoassay for Hepatitis B Diagnosis"
  - 10.2 "Radiation Sterilization of Biological Tissue Grafts"
  - 10.3 "Use of Computers in Technetium-99m imaging"
11. Co-ordinated Research Programme (CRP)
  - 11.1 "Imaging Procedures for the Diagnosis of Liver Diseases" Phase II
  - 11.2 "Improvement of Cancer Therapy" Phase II
  - 11.3 "The Standardization of I-131 Treatment for Hyperthyroidism with on Intent to Optimize Radiation Dose and Treatment Response"
12. Projects with TC and CRP Components
  - 12.1 "Nuclear instruments Maintenance"
13. New Project Proposals (if any)
14. Concluding comments by Chairperson

1515 - 1530      Coffee Break

1530 - 1730      **SECOND TECHNICAL SESSION**

**Agricultural Projects:**

15. Constitution of Project Committee
16. Technical Co-operation Projects and CRP Components
  - 16.1 "Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen"
  - 16.2 "Public Acceptance and Trade In Irradiated Food"
17. New Project Proposals (if any)
18. Concluding Comments by Chairperson

**TUESDAY, 28 MARCH 1995**

0900 - 1030      **THIRD TECHNICAL SESSION**

**Research Reactor, Energy Based and General Projects**

19. Constitution of the Project Committee

20. Research Reactor Technical Co-operation Project

20.1 "Research Reactor Utilization"

21. Energy Based Technical Co-operation Projects

21.1 "Energy and Nuclear Power Planning"

22. New Project Proposal (if any)

23. Concluding comments by Chairperson

1030 - 1045      Coffee Break

1045 - 1230      **FOURTH TECHNICAL SESSION**

**Radiation Protection Projects**

24. Constitution of Project Committee

25. Technical Co-operation (TC) Projects

25.1 "Radiation Protection Infrastructures"

26. Co-ordinated Research Programme (CRP)

26.1 "Reference Asia Man"

27. New Project Proposals (if any)

28. Concluding Comments by Chairperson

1230 -1400      Lunch

1400 - 1530      **FIFTH TECHNICAL SESSION**

**Regional Industrial and Environmental Project**

29. Constitution of Project Committee

30. Report on 1994 activities on the Joint UNDP/RCA/IAEA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Sustainable Development.

31. Concluding Comments by Chairperson

1530 - 1545      Coffee Break

1545 - 1715      **COUNTRY STATEMENT**

32. Receipt of Country Statements

**WEDNESDAY, 29 MARCH 1995**

0800 - 1700      **SCIENTIFIC VISIT**

**THURSDAY, 30 MARCH 1995**

0930 - 1045      **SECOND ADMINISTRATIVE SESSION**

33. RCA Action Plan 1995

34. RCA Cost Projections 1995-1996

1046 - 1100      Coffee Break

1100 - 1230      Break

1230 - 1400      Lunch

1400 - 1500      **Session continuation**

35. Other business



1500 - 1515      Coffee Break

1515

**CLOSING CEREMONY**

36. Acceptance of Draft Documents

37. Closing Remarks

37.1 IAEA

37.2 MINT

38. Official Closing by the Director General of MINT



**Project RAS/6/018**

**Activities in 1994 and work plan for 1995**

1. **Title:** Diagnosis of Hepatitis B (HBV) infection by radioimmunoassay (RIA)
2. **Participant Countries:** Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam
3. **Technical Officer:** R.D. Piyasena
4. **Activities and Achievements in 1994**

The detection of a selected panel of HBV markers in human serum by RIA began in 1992-93 with the supply of a complete package of bulk reagents for the 5 markers concerned from a regional source, (in China). Following the successful introduction of the methodology concerned, a regional training course in mid-1993 in Beijing, modified the techniques so as to make them conform more closely to the true "bulk reagent" based methods as implemented in the previous RCA project RAS/6/011, "RIA of thyroid related hormones". The significant advance was that some vital primary reagents including quality control material and the solid phase (antigen or antibody linked beads) for the two assays most commonly performed, for HBsAg and HBsAb, were locally prepared from the antigen or antibody solutions obtained in bulk form and not pre-coated as before. This resulted not merely in the transferring of the skills needed to prepare solid phases (i.e linking biomolecules onto solid phases), but also in a very significant reduction costs.

The achievements of the project in 1994 largely derived from the success of the regional training activity, as above mentioned, the previous year. After a few initial problems, all participant laboratories were able to familiarize themselves with the new technology and, with increased supplies of reagents being possible (due to the reduction in costs) the clinical studies, (i.e. the screening programme) was implemented on an extended scale. Reagents for the HBsAG and Ab assays were

locally prepared but those for the other three markers (HBeAg, HBeAb, and HBcAb) which need to be measured only in selected cases, depending on the results of the HbsAG and Ab assays, were still supplied in complete bulk form. On account of that these analyses are measured less often, the cost saving in making up reagents for them, as opposed to obtaining them in bulk form as and when required, is not significant enough to make the exercise worthwhile.

The results of the clinical studies were presented at a meeting of national coordinators held in Sydney, Australia, in October 1994. The HBsAg prevalence rates ranged from 0.15% (in Sri Lanka) to as much as 12.6% (in Viet Nam) among pregnant subjects, which is the patient group with highest priority. Follow up testing for HBeAg showed that about 30% of these women were positive for this marker of infectivity, irrespective of the prevalence rate of HBsAg itself. The studies also showed that, in the region in general, about 50% of cases primary liver cancer had associated high levels of HBV infection. Measurement of anti HBsAg (HbsAb) showed that about 1 in 10 of persons infected become chronic carriers, except where the infection is acquired in infancy. Infection rates in blood donors ranged from less than 0.1% (in Sri Lanka) to 18% (in Bangladesh) and infection among health care personnel ranged from 0.15% (in Sri Lanka) to 7.8% in the Philippines.

## **5. Work plan for 1995**

The project will progress in two directions.

### **5.1. Methodology**

A regional training course in February 1995, in Bangkok, will further advance the bulk reagent based approach. The new techniques that will be introduced will be the preparation of the 125-Iodine labelled antibodies and antigens for the HBsAg and Ab assays and the preparation of monoclonal antibodies for the same purpose. If this course will have the same success as the one in Beijing in 1993, most laboratories will make up their own tracers and a few of the more advanced institutions should be able

to prepare monoclonal antibodies as well, for local use and also, possibly, for regional distribution. Impetus to the clinical work from the resultant decrease in cost will be very considerable.

## **5.2. Clinical studies**

All participant laboratories are strongly placed to extend the scope of the screening programmes already ongoing. Screening should extend to as many as possible (ideally 100%) of pregnant subjects attending antenatal clinics and an increased proportion of the other population groups as well.

**6.** A meeting of national coordinators will take place in 1995 or early 1996 at which results will be evaluated, possibly written up for publication, and future project directions planned. If a source of bulk reagents for the detection of Hepatitis C (HBC) can be found, it would be logical to extend the project to the assay of this marker - vitally important in the context of liver cancer - in 1996.



**RCA ANNUAL REPORT FOR 1994**

<b><u>Project title and number:</u></b>	Radiation sterilization of tissue grafts (RAS/7/003)
<b><u>Project description:</u></b>	Phase II of the RCA project on radiation sterilization of tissue grafts, begun in 1993, continued during 1994 to make successful inroads into, respectively, integration of the total quality system (QC/QA) in tissue graft production in accordance with the highest achievable clinical quality for recipient patient health safety, and regional harmonization in the tissue banking management guidelines among the RCA Member States of the Asia and Pacific region and attainment of a fully-integrated modular training curriculum in tissue banking. The IAEA's RCA tissue banking project activities, in keeping with the aims of promoting transregional co-ordination of current expertise and experience of the tissue banking operators and specialist surgeon end-users to foster an enhanced remedial return in reconstructive medicine, included the joint holding in conjunction with the European (EATB) and American (AATB) tissue banking associations of the Conference on Tissue Banking and Clinical Applications of Grafts, held in October 1994 at the Vienna International Centre (VIC). This successful joint enterprise achieved a head-start advance in the criteria and guidelines for standardization, quality assurance and ethical aspects of the applications of ionizing radiation in tissue banking. The health-welfare scopes of tissue banking of radiation-sterilized tissue grafts were widened, and there was geographical enlargement of the RCA tissue banking map through Mongolia and Myanmar joining the programme during 1994.
<b><u>Participating Member States:</u></b>	Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.
<b><u>Project Officer:</u></b>	R. Mukherjee
<b><u>Major activities and achievements in 1994:</u></b>	<ol style="list-style-type: none"> <li>1. Further follow-up refinements of the draft modular training curriculum in tissue banking through the Expert Advisory Group Meeting (EAGM) in Clwyd Tissue Bank, Wrexham, United Kingdom, held from 11 to 15 April 1994, and the Regional (RCA) Training Course on Open Learning Techniques Applied to Radiation Sterilization of Tissue Grafts, held in Suzhou, China, from 13 to 24 June 1994.</li> <li>2. RCA National Co-ordinators Meeting (NCM) held from 3 to 7 October 1994 at the VIC in Vienna in conjunction with the joint IAEA/EATB/AATB Conference on Tissue Banking and Clinical Applications of Grafts.</li> <li>3. Expert Advisory Group Meeting (EAGM) on Clinical Applications of Radiation-sterilized Tissue Grafts, held at the VIC in Vienna, from 10 to 12 October 1994.</li> <li>4. Expert review and recommendations on individual RCA country developments in tissue banking of radiation-sterilized clinical grafts, which covered China, Malaysia, Mongolia, Pakistan, Sri Lanka, Thailand, and Vietnam.</li> <li>5. Upon consideration of the increasing co-ordinating and supportive role(s) of the Bangkok Biomaterial Centre in Bangkok, Thailand, in tissue banking as extended to the developing RCA Member States in upgrading of their trained manpower status, two major pieces of equipment, viz.</li> </ol>

a high-temperature oven for bone grafts (Multitherm) and a cobalt-60 gamma irradiator (Gamma Chamber 5000) have been provided under the RCA equipment budget amounting to approximately US\$200 000.

6. In conclusion, the achievement trends of project RAS/7/003 are indicative of progressive regional self-sufficiency of the Member States through use of indigenous resources.

Workplan for 1995 activities: 1. Continuation of RCA country development reviews in tissue banking (i.e. please see following list):

Thailand and Republic of Korea, from 28 January to 13 February 1995.

China and the Philippines, from 17 to 28 July 1995.

Bangladesh and Myanmar, later in 1995.

2. Curriculum working party mission to be held in Berlin Tissue Bank, Germany, from 15 to 26 May 1995. The participants will be:

From RCA countries

Dr. A. Nather

Dr. N. Yusof

Dr. R. Khan

Dr. N. Agcaoili

From outside RCA region

Professor G.O. Phillips (United Kingdom)

Professor R. von Versen (Germany)

Dr. P. Beaumont (United Kingdom)

Dr. M. Strong (USA)

3. Regional workshop for RCA tissue banking project RAS/7/003 to pilot curriculum with the tissue banking operators in the RCA region, to be held at the National University Hospital, Singapore, from 18 to 29 September 1995.

4. Executive Management Seminar to inform decision-makers and assist the members of the public to build up awareness on tissue banking and to advance the donor programme, to be held in Singapore from 13 to 15 October 1995, Malaysia from 17 to 21 October 1995, Indonesia from 23 to 27 October 1995, and Philippines from 13 to 27 November 1995.



# P r o s p e c t u s

- Title:** REGIONAL (RCA) TRAINING COURSE ON OPEN LEARNING TECHNIQUES APPLIED TO RADIATION STERILIZATION OF TISSUE GRAFTS
- Place:** Suzhou Medical College Affiliated First Hospital, Suzhou, China
- Date:** 13 - 24 June 1994
- Deadline for nominations:** 15 April 1994
- Organizers:** International Atomic Energy Agency in co-operation with the Government of China through the Suzhou Medical College Affiliated First Hospital
- Language:** English.
- Participation:** The training course is open to 26 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the course:** This training course will build on the outputs of the Regional (RCA) Workshop on Total Quality Systems for Tissue Banking of Radiation-Sterilized Surgical Grafts held in Jakarta, August 1993, and the Regional (RCA) Workshop on Radiation Sterilization of Tissues: An Open Learning Programme held in Ho Chi Minh City, November 1993, and will further advance the preparation of materials for use in the open and distance learning programme being prepared for this project. Countries will be allocated specific topic areas which will be developed into ODL format.
- Participants' qualifications:** It is essential that nominated candidates are working with, or strongly associated with the tissue banks participating in this project. Preferably the respective National Coordinator should be nominated.
- Application procedure:** Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 April 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.
- It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the training course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to China and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the training course and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

**Project Title:** Regional Training Course on the Use of Computers in Nuclear Medicine

Project RAS/6/016

**Project Officer:** Y. Xie

**Participating Member States:** Countries in the RCA Programme: Australia, Bangladesh, People's Republic of China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

**Project Objectives:** The main objective of the project is to promote effective use of nuclear medicine computer systems in the developing member states. Due to the fact that computers have become one of the essential instruments in nuclear medicine studies, and majority of responsible staff in nuclear medicine departments did not receive the necessary and systematic training in this aspect, this training is indispensable for physicians, medical physicists and technologists.

**Major Activities in 1994:** After three successful courses (funded by Australia), a fourth regional course (supported with the Agency's TC funds) was conducted by various Australian nuclear medicine departments and experts. The Australian host institutes completed a text book and a menu for practicals for the course, which could be used for follow-up national courses in the future. Due to the big success of the training series, and large demand from developing countries, it has been decided to upgrade the course from regional to interregional in 1997.

## P r o s p e c t u s

Title: REGIONAL (RCA) TRAINING COURSE ON THE USE OF COMPUTERS IN NUCLEAR MEDICINE

Place: Nuclear Medicine Department, St. Vincent's Hospital Limited; and Australian Nuclear Science and Technology Organisation (ANSTO), Sydney, Australia

Date: 31 October - 18 November 1994

In addition a three weeks attachment in departments in nuclear medicine in the Sydney region will be organized for the participants

Deadline for nominations: 15 July 1994

Organizers: International Atomic Energy Agency in co-operation with the Government of Australia through the Australian Nuclear Science and Technology Organisation and St. Vincent's Hospital Limited

Language: The language of instruction will be English.

Participation: The training course is open to 14 participants from developing RCA Member States in the Asia and Pacific region. Participating countries are encouraged to submit more than one applicant to provide scope for IAEA final selection.

Purpose of the course: The purpose of the course is to provide participants with advanced training and practical experience in the application of computer techniques for analysis of gamma camera data. The training will include coverage of basic aspects of computing in nuclear medicine with emphasis on clinical applications which illustrate the quantitative nature of data analysis. The course will include coverage of system management and quality assurance aspects such as software validation as well as use of the computer for instrument quality control (QC) and communications. Coverage of the basic theory, QC, and application of single photon emission computer tomography (SPECT) will also be included. Efforts will be made to provide vendor-specific tutorials so that participants receive practical training relevant to their own needs. The aim of the course is to provide individuals with background knowledge and practical experience which will permit them to use computers more effectively but also to enable them to provide further training to other professionals in nuclear medicine at a local level.

Participants' qualifications: Candidates should have qualifications in a relevant scientific discipline with previous practical experience in nuclear medicine imaging. Preference will be given to candidates who routinely use computers for image data analysis and who are also in a position to provide training to others (physicians, physicists and technologists) on a national basis.

Candidates must have a good command of English.

Nature of the course:

The course will consist of didactic lectures combined with practical sessions where each candidate will be expected to work independently on computers. The contents of the three weeks formal course will include the following subjects:

- Overview of hardware and software architecture related particularly to current trends.
- Introduction to principles of programming including logic, flow charts, documentation.
- Overview of common data/image processing tools and utilities for data transfer, etc.
- Detailed coverage of clinical applications including relevant physiology, underlying theory of analysis and specific clinical programmes.
- Development of quality assurance procedures including QC and first line maintenance of the camera/computer system, use of computer for instrument QC and software validation, study of software phantoms and file transfer.
- Introduction to SPECT including theory of reconstruction, attenuation, etc., practical application and interpretation, and basic elements of networking.

The course will also include manufacturer-specific tutorials where candidates can either discuss their own specific problems or gain experience on different systems. A workshop will also be included where candidates can discuss their own country's situation with their colleagues.

Post-course attachment:

An essential element of the training offered is the provision of a three-week period attached to departments of nuclear medicine in the Sydney region. Candidates will have the opportunity to working in a busy clinical department where computers play an essential role. Where possible, candidates will be placed in departments which have facilities consistent with the candidate's own equipment and specific areas of interest. Candidates may indicate specific areas of advance study they wish to pursue during this period.

Application procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 July 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Please note that a copy of the nomination form, together with the attached completed questionnaire should also be sent to:

Dr. Judith Freund  
Director, Nuclear Medicine Department  
St. Vincent's Hospital Limited  
Victoria Street  
Darlinghurst Sydney, NSW 2010  
Australia

Telephone: 02-339 1111  
Facsimile: 02-332 4142

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the training course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Sydney and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the training course and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

## Review of 1994 activities

### 1. Project Title and Number:

Strengthening nuclear medicine in RCA member states, RAS/6/022

### Project description:

Started in 1992, the project seeks to strengthen certain areas in nuclear medicine in order to achieve a well balanced growth of this speciality in this region. Significant capacity build up has been achieved in terms of nuclear medical instrumentations, radiopharmaceuticals and trained manpower at the nuclear medicine physician level. However, the effective use of this technology is limited by the lack of appropriate training for nuclear medical technologists. The project activities are aimed at developing a distance education package for nuclear medicine technologists in the RCA region.

### Participant member states:

Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Mongolia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam.

### Major achievements

1. Substantial progress has been made in designing the distance learning package for nuclear medicine technologists. Seven modules consisting of ten units covering a wide range of subjects ranging from basic physics, radiopharmacy, radiation safety, computer, imaging instruments to some important human organ systems are included in this package. Resource materials in the form of text books, technical documents and handbooks are also included in the package.
2. Four member states India, Indonesia, Malaysia and Sri Lanka are included in the pilot phase to test the distance learning package in the field. Supervisors and country coordinators in these four member states are identified.
3. Preparations are underway to field an expert to initiate the learning process to selected nuclear medicine technologists in different medical centres in these four member states.

The Agency has accepted in principle the idea of awarding a certificate to nuclear medicine technologists who successfully complete this distance education programme. However, this is subject to the development of a proper evaluation system for assessing the competence of nuclear medicine technologist - who has successfully completed the course. The award of a certificate should not subject the Agency to any liability. This matter needs to be discussed in detail with the advisory board of this distance learning project. A copy of the letter from DIR-TCIM on this matter is enclosed for information of all concerned.

### Planned activities in 1995

1. Supervisors in each centre help the student technologist to understand the principles and to develop the skills to perform routine nuclear medical investigations with the help of education materials, contained in the distance learning package.

2. Supervisors send periodic evaluation of the students' performance to the chief coordinators through the country coordinators.
3. Chief coordinators provide feedback to student trainees through the established channel.
4. Revision of the distance learning package to make it more suitable and contemporary, in the light of the experience from this pilot field study.



**CRP E1.30.06. Evaluation of imaging methods for the diagnosis of liver diseases in developing countries.**

This CRP was completed in 1993.

It was expected that an atlas of liver imaging would be published in 1994. But due to certain circumstances, this could not be done in 1994, but it will be published in early 1995.

**CRP E1.30.05. Radioaerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries.**

This CRP was completed in 1993.

A monograph entitled radioaerosol imaging of the lung is published based on the work carried out under the above CRP. This will serve as an excellent teaching and resource material for those who want to use this nuclear technique for diagnosis and management of patients with respiratory diseases. A copy of the monograph is enclosed. This will be distributed to all interested persons in the RCA region.

The results of the extended work carried out under this CRP, examining the effect of urban air pollution on lungs of healthy individuals are published in the IAEA Bulletin vol, 36, No 4, 1994 page 10 under the title "Health and environment: Examining some interconnections". A detailed scientific article on this research will be published in one of the leading international medical journals.

**Workplan for 1995: Research Coordination Meeting**

1. Research coordination meeting to consolidate the results of the extended research on AIR POLLUTION AND LUNG FUNCTION in Bombay for 3 working days. At this meeting preparations for a large project to examine the air pollution and lungs in greater depth and detail will be made and will be proposed for funding by willing international, regional or national organizations.

One participant (the chief scientific investigator of the erstwhile CRP E1.30.05) from each of the following member state will attend the meeting, ie Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines, Singapore and Thailand.

2. Aerosol nebulizers, to be supplied by the Bhabha Atomic Research Centre free of cost, will be distributed through UNDP to the 10 research laboratories in the countries mentioned above for carrying out further research in future.

**Extract from mission Report by IAEA Technical Officer: Mr. F. Durosini-Eti to act as Scientific Secretary to the third and Final Research Co-ordination Meeting (RCM) for the Co-ordinated Research Programme (CRP) on "Computer-assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix in the Asia and Pacific Region (RCA)". The Meeting was held at the Korea Cancer Centre Hospital, Seoul from 28 to 30 March 1994.**

The basic aim of this CRP was to assess the clinical relevance and impact of introducing personal computers with appropriate soft-ware into radiotherapy planning and dosimetry in the developing countries. Most of these countries cannot afford the cost of more sophisticated dedicated computerized treatment planning systems which cost about US\$350,000 each. Consequently, manual planning and dosimetry is being done. Such manual techniques are laborious and often prone to inaccuracies. In addition, for larger departments where many patients are seen, it is not always possible to cope with such techniques. The situation is made worse with the dearth of experienced medical physicists. The use of personal-computer-based treatment planning systems, which cost about US\$20,000 each has been shown through this CRP to be an effective and viable alternative to the more expensive systems. The following observations were made based on the personal computer based treatment planning system for the CRP:

1. Low capital investment.
2. Low maintenance costs.
3. Can be operated with minimal training; user-friendly.
4. Room for upgrading/additional improvement in line with advancing technology.
5. Capability for teletherapy planning.
6. Capability for brachytherapy planning.
7. Capability for summation of biological equivalent doses.
8. Various radiobiological models, e.g. linear quadratic, moving soft-probe facility, and information on dose at specific areas of interest.

9. Use of various brachytherapy sources of C0-60, Cs-137, Ir-192, etc.
10. Environmental set-up facilities with fast access and dose computation.
11. Data input accessories, e.g. digitizer, video input or scanning.
12. Options for CT interface.
13. System can be used for:
  - routine radiotherapy needs;
  - teaching;
  - as spare unit to support a more expensive commercial unit.
14. Improved treatment plans and accuracy.

The participants agree that the performance of the personal-computer-based system is probably more efficient than that of some of the current, more expensive, dedicated planning systems. The introduction has also offered those institutes without an improved facility which would result in better treatment planning, accuracy and an improvement in the survival/cure rates among patients.

The participants submitted copies of their final report (with diskette copies) for further editing and publication in the proposed TECDOC.

The participants would like a new CRP introduced based on the experience from this project.

**Project Title and Number:**

The standardization of I-131 treatment for hyperthyroidism with an intent to optimize radiation dose and treatment response. E1.20.14.

**Project Description:**

To date there has been no systematic study of different therapeutic approaches for hyperthyroidism using iodine-131, nor was there any prospective study to evaluate the efficacy and incidence of post-therapy hypothyroidism, using the smaller dose approach.

The project started this year 1995 and aims

- 1) To prospectively obtain and analyze the Asia-wide statistics on remission rate and post therapy hypothyroidism, with different approach i.e. conventional vs. small dose of I-131.
- 2) To determine the effects of ethnic and geographic factors on response to I-131 therapy.
- 3) To identify the most important factor(s), if any, affecting treatment response.
- 4) To provide standardized protocol of I-131 treatment, to patients with Graves' disease.

**Participating Member States:**

Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, Thailand.

**Project Officer:** T. Yamasaki

**Major activities in 1995:**

- 1) Each participating country will establish a co-ordinated center headed by a nuclear medicine specialist who will be responsible for the completion of this descriptive-analytical investigation.
- 2) Screening and inclusion of patients
- 3) Performance of required RIA tests
- 4) Administration of appropriate therapy according to low dose and high dose groups. Single dose treatment shall be employed. Randomised allocation of treatment with either conventional or small dose of I-131 to patients will be made. To patients in Group A, a dose of I-131 equivalent to an absorbed dose of 50-60 Gy will be given. The second group (Group B) will receive a higher dose of 80-90 Gy.
- 5) Regular follow up of patients treated as per the protocol.
- 6) The first Research Coordination Meeting (RCM-583) will be held in Manila, Philippines with the purpose to review both the methodological and analytical aspects of the project and future project directions will be identified.

1995-01-27

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**Project Title:** MAINTENANCE OF NUCLEAR INSTRUMENTS  
Project RAS.4.008

**Project officer:** Y. Xie,

**Participating Member States:** Countries in RCA Programme: Australia, Bangladesh, P.R. of China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam

**Project Objectives:**

The main objective of the project is to strengthen the technical infrastructures of nuclear research and applications in the region by improvement of nuclear instrumentation maintenance and repairs. It is requested to enhance national and regional training efforts and to establish a modality for responding urgent requests in connection with maintenance support which can not be met from local budget. It is also requested to upgrade some important nuclear medicine instruments and to integrate preventive maintenance with quality control for key nuclear instruments in order to ensure their optimum operation as well as normal working condition.

**Major Activities in 1994:**

1. Regional workshop on upgrading of analogue gamma cameras with IBM PCs and relevant software, Kota Bahru, Malaysia, 4 - 22 September 1994. The Agency's upgrading system including hardware and software for clinical studies was taught and successfully demonstrated. The software was intensively practised and distributed to every participant in the workshop. The plan for upgrading 20 analogue gamma cameras in selected nuclear medicine centers for 1995 was worked out.
2. Second task group meeting on regional associations of gamma camera users, Sydney, Australia, 23 - 28 October 1994. At beginning of 1994, the project conducted a survey on technical support of gamma camera manufacturers after sale according to an IAEA relevant questionnaire. The meeting reviewed survey results on service contractual status of and technical support to 213 gamma cameras in China, India, Indonesia, Rep. Korea and Thailand. The survey results and rating among manufacturers were publicized and conveyed to 9 manufacturers concerned, and action plans were made for some manufacturer to improve their service and personnel training in 1995.
3. Regional workshop on quality assurance in nuclear medicine imaging, hardware and software aspects, Bangkok, Thailand, 12 - 16 December 1994. Under the guideline of QA in nuclear medicine, the workshop emphasized on technology transfer in acceptance tests and routine QC of SPECT and multi-head SPECT systems, interlaboratory comparisons with hardware and software phantoms for external assessment of QC and preventive maintenance practices.

4. Some advanced phantoms and test instruments for the quality control of SPECT systems have been sent to some selected nuclear medicine centres in the region. These phantoms have been used in the interlaboratory comparisons which are conducted by a new regional CRP on Research and Certification of Quality Control and Preventive Maintenance of Instruments in Nuclear Medicine Centres (Asia and Pacific).

5. Some spare parts have been sent to nuclear medicine centers for repairing some nuclear medicine instruments according to requests.

#### **Proposed activities in 1995:**

According to the detailed plan made by the second project formulation meeting, Sydney, 1992, the project will have following major activities:

1. Regional workshop on protection of nuclear instruments, Quezon City, Philippines, 27 February - 17 March 1995.
2. Project medium term review meeting, Ho Chi Minh City, Vietnam, 22 - 26 May 1995.
3. Follow up national workshops on QA in nuclear medicine imaging according to the requests from China, Pakistan and Rep. Korea, etc.
4. To upgrade about 20 analogue gamma cameras in selected nuclear medicine centers to set up example in most RCA developing Member States.

YXie/mf  
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## P r o s p e c t u s

- Title:** REGIONAL (RCA) WORKSHOP ON UPGRADING OF ANALOGUE GAMMA CAMERAS WITH IBM PCs AND RELEVANT SOFTWARE
- Place:** Nuclear Energy Unit, Kuala Lumpur, Malaysia
- Date:** 5 - 23 September 1994
- Deadline for nominations:** 15 May 1994
- Organizers:** International Atomic Energy Agency in co-operation with the Government of Malaysia through the Nuclear Energy Unit
- Language:** English.
- Participation:** The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region. Participating countries are encouraged to submit more than one applicant to provide scope for IAEA final selection.
- Purpose of the workshop:** The purpose of the workshop is to provide participants with advance training and practical experience in gamma camera/computer systems, gamma camera interfacing with IBM PCs and relevant clinic application software. The workshop will include necessary circuitry explanation and analysis, operation and understanding of clinic software, installation and maintenance of the whole upgrading systems. The aim of the workshop is also to provide individuals with background knowledge and practical experience which will permit them to correctly install, operate and maintain the IAEA IBM PC based gamma camera upgrading systems.
- Participants' qualifications:** Candidates should have qualifications in a relevant discipline with previous practical experience in operation or service of gamma cameras. Preference will be given to candidates who routinely carry out studies with medical computers and have knowledge of both computer hardware and software in nuclear research centres or nuclear medicine centres, and who are in a position to provide training to others (technicians, engineers or technologists) on a national basis.
- Nature of the workshop:** The workshop will consist of didactic lectures combined with practical sessions where each candidate will be expected to work independently in gamma camera interfacing and computer application for nuclear medicine.
- The contents of the workshop will include demonstrations and practical sessions in the following subjects, as well as hospital and electronics workshops visits:
- Introduction to gamma camera/computer systems
    - principles of operation
    - basic functional blocks
    - basic requirements from analogue gamma cameras for upgrading

- Typical medical computer systems
  - hardware and clinic application software
  - advanced studies with medical computers
- Gamma camera interfacing with IBM PC
  - IBM PC bus and timing
  - circuit analysis of the IAEA interfacing card
  - acquisition software
  - installation and maintenance
- Modern correction circuits of the state-of-the-art gamma cameras
  - principles of correction methods and units
  - circuit analysis of the IAEA system
  - quality control tests with the correction unit
- Main function of upgrading system software
  - data and imaging acquisition and standardization
  - image display, processing and storage
- Practice with clinic application software
  - computing in nuclear medicine
  - software phantoms and their applications
  - modification of the software for specific needs
  - software protection and updating.

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 May 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Kuala Lumpur and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.



- **New Project Proposals**

- . Determination of Glomerular Filtration Rate by Nuclear Medicine Techniques: Validation of the Plasma Clearance and External Counting Methods and its Application in the Management of Diabetic Nephropathy
- . Optimization of Fractionations of HDR Brachytherapy in Combinations with Teletherapy in the Curative and Palliative Treatment of Common Malignant Diseases using a PC-based Planning and Dosimetry System.
- . Data Collection on Women, Health and Development
- . Extension of use of Cobalt-60 for Brachytherapy of Uterine Cancer in the RCA Member States
- . Enhancement of Production and Quality Control of Radioisotopes and Radiopharmaceuticals



**Summary of Proposal**

**Determination of Glomerular Filtration Rate  
by Nuclear Medicine Techniques :  
Validation of the Plasma Clearance and External Counting  
Methods and its Application  
in the Management of Diabetic Nephropathy**

**by**

**Johan S. Masjhur**

**School of Medicine Padjadjaran University  
Dr. Hasan Sadikin General Hospital  
Bandung - Indonesia**

## **Summary of Proposal**

### **Determination of Glomerular Filtration Rate by Nuclear Medicine Techniques : Validation of the Plasma Clearance and External Counting Methods and its Application in the Management of Diabetic Nephropathy**

by

**Johan S. Masjhur**

*School of Medicine Padjadjaran University  
Dr. Hasan Sadikin General Hospital  
Bandung - Indonesia*

#### **Background**

The determination of glomerular filtration rate (GFR) is an important part of the evaluation of renal function in patients with acute or chronic renal failure of many different etiologies. In this regard, a significant development of nuclear medicine techniques has been made over the year in quantifying renal function including GFR.

The radiopharmaceutical agent of choice for accurate measurement of GFR is Cr-51 EDTA. The plasma clearance of Cr-51 EDTA is regarded as 'gold standard', since it is closer to urinary inulin clearance. Unfortunately, Cr-51 EDTA is not easily available in some countries, expensive, and the technique is cumbersome. Those are among the reasons why many centers prefer to use radiopharmaceutical agent Tc-99m DTPA as an alternative. Tc-99m DTPA is inexpensive, has a low radiation dose, and most importantly, it can be used for renal imaging and quantifying individual renal function, making it the GFR agent of choice in clinical nuclear medicine practice (Blafox, 1991). The technique is also simple and non-invasive.

Individual GFR of each kidney can be measured accurately by using Tc-99m DTPA, either from the rate of disappearance of the tracer from plasma (plasma clearance method) or from the rate of uptake into the kidneys (external counting method). Tc-99m DTPA clearance has generally correlated well with the plasma clearance of Cr-51 EDTA (Peters, 1991).

The plasma clearance methods include compartmental analysis method (require 4 to 6 blood samples) and simplified method (require only one or two samples). Simplified method and external counting method currently have the role in daily clinical practice.



Very close agreement has been reported in the literatures between the two blood samples method with the continuous infusion method, multiple blood sampling method or inulin clearance; two blood samples method was well-validated (Ham and Piepz, 1991).

However, there is no general agreement on the appropriate sampling time either in single sample or two or more samples method. Sampling time for single blood sample method were varied from 2, 3, and 4 hr after injection (Shore, 1991). While for two blood samples method the sampling times can be at 2 and 3 hr or at 2 and 4 hr after injection.

Futhermore, it should be noted that the accuracy of external counting method is considerably less than that of plasma clearance method because of the problems found by variations in renal depths, background contribution, and the numerous assumptions which have to be made for the technique (Blaufox, 1991).

Currently there is no data available on the normal values of GFR using either plasma clearance (single or multiple blood samples method) or gamma camera external counting method for different age groups from our population. Validation of the techniques and data on normal values are extremely important as basic reference for further study in kidney disease using nuclear medicine techniques.

In clinical practice, accurate and serial determination of GFR will be of great value in the management of many kidney diseases among others diabetic nephropathy; GFR is a very useful and sensitive indicator to evaluate the progression of disease. In this study special attention is given to diabetic nephropathy based on the following considerations :

- diabetic nephropathy is a well defined syndrome characterized by persistent proteinuria, progressive decline in GFR, and raised arterial blood pressure;
- the prevalence of diabetic nephropathy due to Non Insulin Diabetes Mellitus (NIDDM) is quite high in the developing countries; diabetic nephropathy if not properly manage will jump to a serious socioeconomic problem because of end stage of renal disease where the patients will need dialysis and transplantation;
- periodic evaluation of GFR is important in the management of diabetic nephropathy in order to monitor the progression of disease as well as the result of therapy.

#### Objectives of the study

1. To determine the GFR values of healthy Indonesian subjects from different age groups by external counting and plasma clearance method (single and multiple blood samples method).

2. To determine the GFR values of patients with different stages of diabetic nephropathy by using external counting and plasma clearance method.

#### **Type of Study**

This study is a multicenter and multiyear study involving three major teaching hospitals in Indonesia i.e. Ciptomangunkusumo Hospital in Jakarta, Hasan Sadikin Hospital in Bandung, and Soetomo Hospital in Surabaya. The length of the study will be three years.

#### **Subject and method**

From each center, sixty normal subjects with age range from 20 to 50 yrs and sixty patients with diabetic nephropathy from the same age group with serum creatinine level between 2 to 6 mg/dl will be recruited.

GFR will be determined in each subject using Tc-99m DTPA by the following methods :

1. plasma clearance method
  - single blood sample : sampling time at 2 hr after injection ;
  - two samples method : sampling times at 2 and 4 hr after injection; if necessary additional samples can be withdrawn (multiple samples).
2. gamma camera external counting method without blood sample (Gate's protocol)

#### **Ethical consideration**

Approval from local ethical committee and informed consent are required before excecuting the study.

#### **Benefit of study**

The benefit of this study will include validation of nuclear medicine techniques in determining glomerular filtration rate in our population and encouragement of the clinicians to use the techniques in their daily practice particularly in the management of patients with diabetic nephropathy.

### Supporting data

- physical examination, blood pressure
- blood sugar, HbA1C
- blood urea nitrogen and creatinine level
- urinalysis, microalbuminuria/proteinuria
- ultrasonography of the kidney (if required)

### Budget

1. Normal healthy subjects	:180 x USD 200.00	=USD 36.000.00
2. Diabetic nephropathy	:180 x USD 200.00	=USD 36.000.00
3. Supporting data	:360 x USD 150.00	=USD 48.000.00
4. Consumable goods	:	=USD 12.000.00
5. Others	:	=USD 12.000.00
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Total		=USD 144.000.00

### References

Blaufox, MD. Procedures of Choice in Renal Nuclear Medicine. J Nucl Med 1991;32:1301-1309.

Ham HR and Piepz A. Estimation of Glomerular Filtration Rate in Infants and in Children Using a Single-Plasma Sample Method. J Nucl Med 1991;32:1294-1297.

Peters AM. Quantification of Renal Haemodynamics with Radionuclides. Eur J Nucl Med 1991;18:274-286.

Shore RM. Glomerular Filtration Rate in Children : Where We Have Been; Where We Are Going. J Nucl Med 1991;32:1297-1300.

Bandung, 7 January 1995.



## Proposed IAEA Co-ordinated research project (CRP)

Project Title: Optimization of fractionations of HDR Brachytherapy in combinations with Teletherapy in the Curative and Palliative Treatment of common malignant Diseases using a PC-based Planning and Dosimetry System.

### Introduction and Back ground.

During 1991-1994, an IAEA co-ordinated research project on the Introduction of Computer assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix in Asia and Pacific was initiated with a successful and useful results for developing countries which has several common problems. The results of this co-ordinated research project (CRP) can be applied in all developing countries not only in Asia and Pacific but also in other parts, any where in the world.

As the people are well aware of the danger and on the other hand, the curability of cancer of the uterine cervix, all the radiotherapy departments are now overloaded with new cases of Carcinoma of the Cervix both for radical treatment and for palliative treatment. Low-dose rate brachytherapy eventhough has been accepted as the most effective treatment of choice for the early cases of Carcinoma of the Cervix but this kind of treatment is not the answer for many radiotherapy departments with many kinds of constraints. The long treatment time for each treatment, the long over all treatment period, the availability of treatment beds, the problems of radiation hazards and protection to the nurses and the treatment staffs make the low dose rate brachytherapy not feasible to be used to all radical treatment for every cases of the patients in developing countries. The high dose rate (HDR) remote after loading techniques may be the answer to overcome the overloaded department to shorten the long waiting lists which may take 3 months before one can have the bed available for an admission to be treated by brachytherapy. A stage I case on first diagnosis may already become stage II case before one can have the bed available for treatment.

The high dose rate techniques for brachytherapy may solve the problem of the bed availability because the patient may be treated as an out-patient and does not need any bed. It may also solve the problem of radiation hazard and protection but it can not solve the problem of optimization of the dose-time relationship of the brachytherapy and not be able to solve the problem of optimization of the combinations of the brachytherapy and teletherapy for the benefit of the patients.

Anyhow the optimization of the brachytherapy, i.e. the dose per fraction, the time interval between fractions, the number of fractions for overall treatment, the different dose rates in each fraction remain to be the problems for the radiotherapist to study scientifically and statistically. The combinations of brachytherapy and teletherapy also remain to be a subject to be studied.

The brachytherapy may be given prior to teletherapy, in between the course of teletherapy or after the complete course of teletherapy. The radiobiological effectiveness of different dose rates of brachytherapy is still waiting to be explored clinically.

The problem of the developing countries are many folds. The lack of budgets for high technology instruments for the treatment of cancer, the trained or experienced personnels, and the availability of hospital beds, are always inadequate. There are also psycho-social factors of the patients themselves which prevent them from coming to be treated in the early stages of the diseases. The economical factors of the patients will make them intolerable to prolonged treatment period which keep the patients away from home and unable to earn their living. And indeed, it is the economy of the patients which make them to be lost from follow up.

The IAEA co-ordinated project (CRP) on the introduction of a PC-based planning and dosimetry system has partially solved the problems in the availability of high technology instruments for the treatment of carcinoma of the cervix by radiotherapy in the Asia and Pacific Regions. Anyhow carcinoma of the Cervix in the female population of the developing countries still remain in the high incidence ranking. The early cases still are in the waiting lists to be treated curatively. The high dose rates brachytherapy may be the treatment of choice which will answer the problems of inadequacy of hospital beds.

The Optimization of fractionations of HDR Brachytherapy in combinations with Teletherapy in the Curative and Palliative Treatment of common malignant Diseases using a PC-based Planning and Dosimetry System not only applicable to the treatment of Carcinoma of the Cervix but also applicable to the treatment of Carcinoma of the Nasopharynx, Carcinoma of the Oesophagus, Carcinoma of Vagina, Carcinoma of the Uterus, and Carcinoma of the bronchus.





WHO doc. EB/95/59, 9 January 1995  
Report by the Director General to the Ninety-fifth Session  
of the Executive Board on Women, health and development

In Summary

The report notes that "in order for Member States to be able to use relevant information for policy development and management, and to include such information in their regular reporting on women's health and health care, it will be necessary that health information systems collect and analyze sex-specific data as a matter of routine."

As WHO's initiative may impact Member States' prioritization of funding allocation, RCA Coordinators may wish to provide their relevant Ministry dealing with (women's) health issues with information on those projects within the framework of the RCA Programme that have direct impact on women.

Suggested Action by RCA Coordinators:

Action by the RCA Coordinators in providing statistics and other relevant background information could prove useful to the RCA Programme in several respects, namely:

- \* to ensure that Health Ministries are informed of the relevance of nuclear technology to the health sector;
- \* to highlight the Sustainable Human Development (SHD) framework of the RCA Programme (particularly since the information provided will form part of a database available to other organizations in the UN system and donor countries); and
- \* to form part of the overall public awareness and acceptance initiative being mainstreamed into all project activities.

RCA Projects with high impact on women's health:

- \* Japanese funded CRP on Cervical Cancer (past and new Proposal) - reproductive health;
- \* Neo-natal hypothyroidism - alleviation of burden on mothers caring for mentally/physically challenged child;
- \* Hepatitis B ( largest screened group pregnant women) - women's health in general, impact on reproductive health;
- \* Tissue Banking (women are a high risk group for burns particularly during food preparation and in the performance of high-risk jobs in both the informal and formal sector e.g. chemical factories, tanning of animal skins) - contributes to overall health and health in the workplace with a speedier, less painful recovery with fewer work days lost .



## **Women, health and development**

### **Report by the Director-General**

The Health Assembly in resolution WHA45.25 on women, health and development requested the Director-General to report back to the Forty-eighth World Health Assembly on the progress in its implementation. Aware of the many advances made, the Health Assembly nevertheless expressed concern over the lack of sex-specific health data and inadequate information on the consequences of diseases for women, and urged Member States to establish a system for reporting on implementation of previous resolutions and take equivalent steps through national policies and programmes. This report highlights the elements relevant to women, health and development in the Ninth General Programme of Work, information needs and problems, mechanisms undertaken to strengthen women's health and examples of activities and experiences at global and regional level. The questions of resources for women's health and the representation of women at senior professional levels are briefly examined. The activities reported represent a continuing process. The Executive Board is invited to note the report.

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## I. INTRODUCTION

1. The Health Assembly in resolution WHA45.25 requested the Director-General, *inter alia*, to report back to the Forty-eighth World Health Assembly on the progress in its implementation. Resolution WHA45.25 relates to several aspects of women, health and development, including the needs for information, and strengthening related aspects of all relevant WHO programmes. This report should be read in conjunction with document EB95/51 (Women, health and development - Global Commission on Women's Health; and preparations for the Fourth World Conference on Women (1995)) which concerns progress with respect to operative paragraph 3 of resolution WHA45.25 relating to the establishment of the Global Commission and its task. It should also be read in conjunction with document EB95/43 (Accelerating the employment and participation of women in the work of WHO).

2. The Health Assembly has continued to take note of the critical impact that women's health, social status and participation has on overall health and human development within families, communities and countries. The role of women in the health-for-all strategy and in the implementation of health systems based on primary health care is such that until the inequities in women's health are redressed and women are involved in health development there will be little progress towards the health-for-all goal. Health has now been recognized as an essential ingredient in sustainable development, and women's health needs and their full and equitable participation in health and other development efforts have been increasingly acknowledged in all international forums during the last decade. Furthermore, the meeting of the health and development needs of women is now generally recognized as an essential human right, reflected in a large number of intergovernmental declarations and human rights instruments.<sup>1</sup>

3. Aware of these many advances, the Health Assembly nevertheless, in its resolution WHA45.25, expressed concern about the lack of sex-specific health data and adequate information on the consequences of diseases for women. It urged Member States to establish a system for reporting on implementation of previous resolutions and take equivalent steps through national policies and programmes, including the greater representation of women at senior levels of decision-making and management. Resolution WHA45.25 also requested the Director-General to undertake action that would ensure that women's health is treated with the greatest attention and urgency, including the use of existing mechanisms and the Ninth General Programme of Work to give proper attention to matters affecting women's health in all areas; the examination of WHO policy and programme initiatives in order to determine whether they might have any effect on the situation of women; ensuring that within each programme area sufficient resources are allocated to matters affecting women's health; and strengthening WHO's focal point for women, health and development. This report presents information on the progress made in the implementation of these activities.

## II. THE PROGRAMME AND POLICY BASIS AND NEEDS FOR INFORMATION FOR ACTION

4. The consultations and deliberations within the Organization and at sessions of the Executive Board and Health Assembly have provided a good opportunity to ensure a high profile for women's health in the Ninth General Programme of Work,<sup>2</sup> in which the special needs and contributions of women to health development are cited in the sections on health situation and trends (paragraphs 10, 12, 17, 20 and 24), goal and targets (paragraph 46), WHO's functions (paragraph 63), integrating health and human development in public policies (paragraphs 71, 72 and 73), ensuring equitable access to health services (paragraph 78), and in promoting and protecting health (paragraph 92). The Programme of Work recognizes the importance of and commits the

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<sup>1</sup> These include the Convention on the Elimination of All Forms of Discrimination Against Women, the Convention on the Rights of the Child, and the Programme of Action of the International Conference on Population and Development.

<sup>2</sup> *Ninth General Programme of Work covering the period 1996-2001*. Geneva, World Health Organization, 1994.

Organization to improvements in indicators and development of new ones for monitoring, *inter alia*, women's health. Goal 4 (paragraph 46) is specifically directed "to improve the health and well-being of women". The specific targets to attain this goal are directed at: (4.1) reducing maternal mortality by 50%; (4.2) providing pregnant women with "access to prenatal care, trained attendants during childbirth and referral facilities for high-risk pregnancies and obstetrical emergencies"; and (4.3) increasing disability-free life expectancy at birth for women by 15% in all populations. Targets within three of the remaining nine goals are specifically relevant to the needs of women, including management of sexually transmitted diseases, access to family planning, and attention to the nutritional needs of women.

5. In the analysis of the health situation and the strategies for health development, the Ninth General Programme of Work draws attention to the risks of marginalization of vulnerable groups, particularly women, in overall development. It also emphasizes the human-rights basis for the protection of women's health at all stages of life, noting their increased vulnerability in situations of economic hardship, violence, warfare and environmental degradation. Among the major intended results of the Programme of Work are the removal of inequities and the meeting of the special needs of women.

6. The needs for information must be seen in relation to health and health-care indicators and the policy development and managerial processes for health development, both within Member States and in the Organization. Member States have not been able to report consistently on the progress made in relation to women's health. In part this is because of continuing weaknesses in management information systems for health and the fact that registration of vital events is either inadequate or absent. Thus there is still a serious lack of high-quality information about matters of concern to women, including maternal mortality and morbidity and access to quality maternal health care. Furthermore, information systems specifically designed to examine the sex-specific aspects of women's health beyond reproductive health have not been established. In order for Member States to be able to use relevant information for policy development and management, and to include such information in their regular reporting on women's health and health care, it will be necessary to ensure that health information systems collect and analyse sex-specific data as a matter of routine. Analysis and reporting of women's health need to go beyond looking only at reproductive health issues in order to assess the effect of sex differences and attitudes on women's health as a whole. Member States, in their commitment to a number of internationally recognized policies, plans and programmes of action<sup>1</sup> have been sensitized and called upon to collect, analyse, report and act upon, to the extent possible, sex-specific data for mortality, morbidity, use of health services and other relevant parameters.

7. In order to be able to monitor women's health and the effect of sex differences and attitudes on health it is essential to establish more sensitive and comprehensive data collection systems and methods of analysis that will permit an evaluation both of the areas of concern specific to women's health (maternal mortality, breast and cervical cancers, reproductive tract infections, menopause, etc.) and of those aspects of health which have a sex-related dimension including the differential impact of diseases and conditions on girls and women (tropical diseases, sexually transmitted diseases including HIV/AIDS, cardiovascular diseases, etc.). At present, many Member States may wish to have technical support and guidance in defining and adapting their information systems to reflect such information needs. In some WHO programmes further methodological work may be required in establishing appropriate indicators and providing guidance to Member States in their application. Such efforts should seek to answer the basic question: Are there sex-specific indicators that are applicable to and obtainable for the health situation, access to services or the use of services relevant to the programme area? Technical assessment will be required which poses the following subsidiary questions: What sex-specific indicators already exist and are being used by WHO and country programmes? Are they useful and easily applicable? Do they help define the nature of the problem or its magnitude and are they suitable for monitoring of trends in the short term? Are there major gaps in the

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<sup>1</sup> These include the health-for-all strategy, the Plan of Action of the World Summit for Children, the Plan of Action of the International Conference on Nutrition, Agenda 21 of the United Nations Conference on Environment and Development and the Programme of Action of the International Conference on Population and Development.

availability of suitable indicators? Are research-and-development activities for indicators required? In order to facilitate global monitoring and support to Member States, WHO is seeking support for a feasibility study to set up a clearing-house on women's health in the Division of Family Health.

8. There are several ways in which policies and programmes could adversely affect the health situation and status of women. The most obvious are when women's particular needs and concerns are not adequately considered, but there are also circumstances in which women are excluded from policy-making and implementation. As with indicators, the impact of policies and programmes can be seen in the framework of a number of subsidiary questions, such as: When women are among the beneficiaries of the activities, are there social, cultural or managerial obstacles to their being full beneficiaries? Are there programme areas unique to the biological, social, cultural or environmental circumstances of women that are not receiving due attention? Do the programme activities in any way affect women in special circumstances, such as single-parent-headed households, working women or women in emergency and refugee situations? It will obviously be necessary to develop a more systematic framework and criteria against which assessment of such effects can be measured. The Interdivisional Steering Committee on Women, Health and Development, referred to in paragraph 9 below will play a major technical and programme role in developing such a framework and adequate indicators to enable Member States and WHO to complete action on this aspect of resolution WHA45.25.

### **III. EXISTING MECHANISMS TO STRENGTHEN WOMEN'S HEALTH**

9. The Interdivisional Steering Committee on Women, Health and Development was created to provide support and guidance for the inclusion of women's "perspectives" and women's health development needs in the medium-term programmes of the Eighth General Programme of Work. The Steering Committee developed a checklist to assist programme directors and managers in the preparation of the Programme. Given the stronger profile for women's health in the Ninth General Programme of Work, the Steering Committee will be reoriented and become proactive, particularly with the establishment of a women's health unit in the Division of Family Health. This will draw upon successful and unsuccessful experiences of technical programmes and regional offices and seek to attain the original objectives of ensuring the expression of the aims for women, health and development in all programmes and activities of the Organization. This will enhance the capacity to attain the goals and targets of the Ninth General Programme of Work relevant to women's health needs and their participation in health development. The Steering Committee will continue to promote the inclusion of women's needs, attitudes and involvement of women's organizations in technical and regional programmes of the Organization, and will promote increased participation of women in decision- and policy-making at all levels. It will also stimulate new approaches in information and data-collection in the area of women's health, and ensure liaison with other agencies in the United Nations system. It will be supported by the women's health unit in the Division of Family Health and will be broadened to include focal points on women's health as well as divisional directors.

10. At WHO headquarters women, health and development has been strengthened by creating the unit of Women, Health and Development (WHD) in the Division of Family Health (FHE). A unit chief has recently been recruited, which will allow accelerated action and the development and consolidation of a strategy. At the regional level, focal points on women, health and development exist. The aim of these focal points at headquarters and the regional offices is to strengthen and coordinate the incorporation of activities for women, health and development in all WHO programmes, provide liaison with other organizations of the United Nations system concerned with women's health and development and ensure that women's needs and attitudes are adequately taken into consideration in health policies and programmes.

11. The following is a small selection of examples of programme activities relevant to women, health and development at the global level:

- (a) the Global Programme on AIDS (GPA) has initiated preparations for a meeting on effective approaches to HIV/AIDS prevention for women and is developing a "women/gender and AIDS resource package";
  - (b) the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), in collaboration with a number of other programmes, through a "gender and health research group", is developing a "healthy women's counselling guide";
  - (c) the Women, Health and Development unit is developing a strategy for work on female genital mutilation which includes the planning of a technical working group to standardize definitions and develop research protocols, and is also developing work on women's reproductive health needs in emergency and refugee situations;
  - (d) the Office of Global and Integrated Environmental Health has a programme for the promotion of research and training on "women, health and development";
  - (e) the Programme on Substance Abuse has a project on "women and substance abuse" and is working with GPA in HIV/AIDS prevention strategies;
  - (f) the Division of Communicable Diseases has held an informal consultation on hookworm infection in women;
  - (g) the Division of Mental Health is producing a series of publications dealing with women and mental health;
  - (h) the Special Programme on Research, Development and Research Training in Human Reproduction (HRP) is promoting regular dialogue between women's health groups and researchers and policy-makers.
12. There are a number of informal networks at headquarters which have a particular interest in women's health. These include the informal group on "gender" and health research, coordinated by TDR, and an informal group on women's "perspectives" in reproductive health which brings together FHE and HRP. The Task Force on Violence and Health is giving special attention to violence against women as a priority area. Within FHE, an informal working group on female genital mutilation brings together representatives from each programme area (maternal health and safe motherhood, family planning and population, child health and development, adolescent health and women, health and development).
13. An informal group now called the "fifty-fifty" group was created in 1973 by a group of staff at headquarters. It aims to provide an informal forum for discussion about the evolving roles of women and men, to eliminate discriminatory practices and attitudes at WHO headquarters and to increase the participation of women in WHO's technical and policy-making bodies. Unfortunately the number of men involved is far below 50%.
14. Activities for women, health and development at the regional and country level have progressed in different ways. Historically, the focus of such activities in different regions has mainly been limited to the context of maternal and child health and family planning activities. Following the International Conference on Population and Development (Cairo, 1994) and the forthcoming Conference on Women to be held in Beijing, this focus is expected to broaden and activities to be seen in terms of women in the context of human and social development. The following are some examples of activities in the regions.
15. In the African Region maternal and child health, including family planning, is one of three high-priority programmes. In addition activities for women, health and development include a network of five

multisectoral country teams actively involved in promoting women's participation and leadership in maternal and child health and family planning. A working group on women's health advises the programme on women, health and development. Resolution AFR/RC43/R6, entitled "Women, health and development", emphasizes the need for Member States to develop an "enabling" legal framework for women in development, and to make appropriate budgetary allocation to the programme.

16. The regional programme for the **Region of the Americas** has three-and-a-half professional and two support staff in the Regional Office connected with a network of 26 full-time focal points in the country offices in Latin America and the Caribbean. During 1995 all Regional Office staff will participate in a series of seminars designed to help them incorporate a "gender perspective" in a more systematic manner into their work. The programme on women, health and development works both as a coordinating unit supporting the work of other technical units in the Region in their efforts to plan programmes and projects from a "gender perspective", and as a technical cooperation programme working with Member States. As a technical cooperation unit, it focuses on making good the dearth of information on "gender gaps" in health and on the health situation of women; on collaboration with other technical units to ensure that health and social-sector data is collected and reported by sex; and on strengthening the capacity of the health system to analyse health data accordingly. Areas of specific programme activities are: violence against women and girls, conditions of indigenous women, "gender and health", adolescent health from a "gender perspective".

17. The **South-East Asia Region** has produced a series of information kits on several health themes, three of which are related to women's health: safe childbirth, safe motherhood and promotion of women's health in South-East Asia. The Regional Office is also producing a series of "issue papers" on women's health for advocacy on health of poor urban women, reproductive tract infections, and women and aging. A kit for "facilitating health action by women" is under preparation for use by women's groups involved in health education. There are several activities on HIV/AIDS prevention, including greater involvement of women's groups in awareness-raising and creation of a special task force on women and AIDS as a part of some of the national AIDS prevention programmes. National meetings on women, health and development have been held in Bangladesh, India, Indonesia, Thailand and are planned in Nepal and Sri Lanka. A regional consultation on action for women's health and development is also being planned for early 1995. A consultant has been engaged to assist in establishing a resource database on women, health and development and a resource centre, and a proposal is under way to commission studies, involving three or four countries in the Region, on reproductive tract infections.

18. The **European Region** launched the "Investing in women's health" initiative in 1993, initially focused on women's health in the countries of central and eastern Europe and the newly independent States of the former USSR; 11 pilot countries and one pilot city were in the first phase. A country-based coordinator was nominated by the ministry of health in each country; "women's health profiles" were prepared for each country and the information permitted the assessment of the highest health priorities for women in each country. In the second phase the initiative will expand to include all the Member States of the European Region. The Regional Office has started collecting and analysing information to assess the highest health priorities and provide the basis for programmes to improve women's health in the Region. The key components of the initiative are: establishing a European women's health network, producing women's health profiles for each of the Member States, compiling the country profiles in a comparative analysis ("Highlights on women's health in the European Region"), and conducting regular meetings of women and health counterparts and of the Women's Health Forum.

19. In the **Eastern Mediterranean Region** special importance has been given to maternal and child health and family planning programmes. A priority for the Region has been to ensure that a trained birth attendant is available in every village in the Region as part of the overall strategy for maternal health. The role of women in health education and increasing awareness among family members of the need for safe drinking-water in the household are two areas being pursued in countries, as is the specific role of women in food

safety programmes. The Regional Office implements special programmes to control anaemia, especially during the reproductive years. Another priority for the region is "women and AIDS".

20. The Western Pacific Region is executing 18 UNFPA-funded projects for maternal and child health and family planning in 15 countries in the Region. These projects have been formulated with careful attention to matters of concern to women, their health problems and reproductive risks, and include activities to increase women's "empowerment" and to facilitate free choice in reproductive matters. A "reproductive health profile" was commissioned for countries of the Western Pacific. The Key Centre for Women's Health in Society, in Australia, was designated as a WHO collaborating centre.

#### **IV. RESOURCES AND REPRESENTATION**

21. In order to measure how far an organization has moved towards integration of matters of particular concern to women into its work it is important to monitor the total and the proportionate expenditure on such matters. However, the accounting system is not structured in a way which allows such monitoring to be done, except where specific line items have been created to incorporate women's needs and attitudes into a programme. Examples of this are the Women's Perspectives work of HRP, the "gender and health" research work of TDR and the research and training programme in women, health and development of the Office of Global and Integrated Environmental Health. The WHD unit in FHE has been allocated one professional and one secretarial staff post from the regular budget, but funds for activities will have to be raised from extrabudgetary sources. Within FHE the programmes on maternal health and safe motherhood and family planning and population focus almost exclusively on women. The adolescent health programme works to promote equitable relations and mutual respect and responsible behaviour between young people of both sexes. While these individual programme initiatives are welcomed, there is the risk that the responsibility for such matters of particular concern to women will be left to the obvious and already convinced programmes and not integrated into the broad programme of work. It is necessary to develop more "structured" mechanisms to ensure that women's health is fully covered at national, regional and headquarters levels. An analysis based on available data on staff grades and posts has been presented in the report by the Director-General in document EB95/43 (Accelerating the employment and participation of women in the work of WHO).

#### **V. ACTION BY THE EXECUTIVE BOARD**

22. The Board is invited to note the report.

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## **PROJECT PROPOSAL- JAPAN**

### **1. PROJECT TITLE**

Extension of use of cobalt-60 for brachytherapy of uterine cancer in the RCA Member States.

### **2. BACKGROUND**

This project is responding to the decision that RCA would establish initiatives that would contribute to the UN "Women in Development Programme" and would also be relevant to the needs and priorities of RCA. Uterine cervix cancer is one of the most frequently found cancers in the RCA region. For treating uterine cancer, radiation therapy is regarded as the most effective modality with regard to therapeutic efficiency and cost-effectiveness, compared with such methods as chemical therapy.

### **3. OBJECTIVE**

To promote regional self-sufficiency in the use of cobalt-60 for brachytherapy of uterine cancer.

### **4. PROJECT STRUCTURE**

The project is designed to have four components.

#### **4.1 Transfer of technology on the manufacture of cobalt-60 sources - Phase I.**

It is proposed to initially transfer the technology for production and manufacture of cobalt-60 sources to the required quality standards to either one or all of three RCA Member States, i.e., China, India and/or Korea. This will involve:

- (1) Assessment visits by Japanese experts to isotope production facilities in these countries to advise on the physical requirement and design as appropriate to the cobalt-60 manufacturing units.

- (2) On-the-job training by Chinese, Indian and/or Korean experts/technicians in Japan .
- (3) Conducting quality assessment inspections of Chinese., Indian and/or Korean products by japanese experts.

#### **4.2 Transfer of technology on the manufacture of cobalt-60 sources-Phase II.**

Once the manufacturing capabilities in China, India and/or Korea have been verified as being able to routinely produce the cobalt-60 source to the required quality standards, other appropriate RCA Member States will be encouraged to undertake the source manufacture through technology transfer under TCDC with India, China and/or Korea. Japanese experts will assist in the monitoring and assessment to ensure that the necessary quality standards are assured. This mechanism will stimulate the maximum regional co-operation and collaboration in fulfillment for the RCA objectives.

#### **4.3 Stimulation of the awareness in the region on the benefits of cobalt-60 brachytherapy.**

The extended use of brachytherapy could be stimulated initially by promotion through a regional executive management seminar for health care administrators and then followed up with national executive management seminars around the region.

Regional and national workshops on brachytherapy for informing medical practitioners/oncologists on the developments in cobalt-60 therapy treatment could assist in bringing heightened awareness, demand and increased utilization. It could be a good strategy to look at the possibility of providing training at the national level for the support services such as nurses.

#### **4.4 Stimulation of the advance use of brachytherapy.**

The interest of those working in this area be stimulated through the setting up of a CRP specifically on some aspects of improvements in such areas as: dose control, combined therapy, clinical studies, etc. Advice will be obtained at later stage on the most appropriate topics.

#### **4.5 Funding**

Japan's special contribution to RCA with expertise and technical contribution from Member States and IAEA.



**PROPOSAL FOR A REGIONAL PROJECT (RCA/UNDER TC)**  
**ON RADIOISOTOPE AND RADIOPHARMACEUTICAL**  
**PRODUCTION AND QUALITY CONTROL**

- A. TITLE :** ENHANCEMENT OF PRODUCTION AND QUALITY CONTROL OF RADIOISOTOPES AND RADIOPHARMACEUTICALS
- B. STARTING DATE :** 1996
- C. DURATION :** TWO YEARS
- D. BACKGROUND :**

Several countries of the Asia and Pacific Region operate nuclear research reactors and sustain radioisotope production programmes to cater the needs of different segment of the society, be for industry, agriculture or medicine. The national programmes for radioisotope production of most of the developing countries of the region have in the past, received technical co-operation from the IAEA. Typically, this co-operation has consisted on the provision of expert advice, training through the fellowship programme, as well as, in the provision of equipment, very often, to strengthen the existing laboratory facilities.

The region as such, has not only achieved an advanced degree of self-sufficiency, but also the expertise of the scientist of the region have developed high level of skills. There are, however, new technical and scientific advances that require further attention in order to introduce these new techniques and benefits from such advances, particularly in the field of radioisotopes and radiopharmaceuticals in medicine.

At the Workshop of Technical Cooperation of Counterparts in the Field of Radioisotope Production in the Asia and Pacific Region, held in Dalat, Vietnam, 23-27 January 1995, which was attended by representatives of 10 countries (Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Republic of Korea, Thailand and Vietnam), the current status of the various radioisotope production programmes and the future need of the region has been reviewed in detail. A consensus has emerged among all the participants, indicating the need and necessity to keep up with relevant advances in the field as well as to strengthen the regional capabilities to self sufficiency in the supply of radioisotopes and radiopharmaceuticals. It was particularly felt that the contribution of the Agency and the Member States of RCA would be indispensable, not only to provide with training opportunities, but also to catalyze and promote further co-operation among the countries of the region.

To accomplish the above, it was felt that the establishment of a regional project, supported by the agency and Member States of the region (through RCA), would contribute a great deal. Therefore, the participants of the Workshop propose the present project for the consideration of the Agency and the RCA.

## **OBJECTIVES**

The objectives of the project are:

- a) to further develop and strengthen the regional capabilities in the field of radioisotope and radiopharmaceutical production in order to meet the national and regional demand.
- b) to increase the availability of newer radioisotopes and radiopharmaceuticals.
- c) to promote and facilitate regional co-operation among the countries of the region.

#### **F. EXPECTED RESULTS**

At the completion of this regional project, it is expected that there will be an increase in the regional and national level of expertise in the field of radioisotope and radiopharmaceuticals production and, improved laboratory facilities to provide a greater availability and supply of medical and industrial radioisotopes.

#### **G. ACTIVITIES UNDER THE PROJECT**

The implementation of this project would be through the contribution of the participating Member States (RCA) and the IAEA. The contribution of the Member States would be by making available laboratory facilities for training as well a national experts.

The Agency in turn, would provide with the coordination of all activities approved under the project and economical support for the organization of workshops, fellowships and expert service. Whenever possible, some funds for the procurement of chemical reagents and other minor accessories would be made available.

#### **H. COSTS OF THE PROJECT**

To implement the activities proposed and listed below, it is proposed the Agency and the RCA Member States provide the fund for the following activities for a period of two years:

**YEAR I (1996)**

Activity	Place/Institution	Duration/Date	Cost
1. Adv.WS on Production of Therapeutic Radionuclides (10 participants)	Korea/Kaeri China/CIAE	2 weeks	20000
2. Adv. WS on Production, measurements, and Q.C of brachytherapy sources (8 participants)	China/NPIC India/BRIT	2 weeks	20000
3. Expert Services	Participating countries	1 m/m	12000
4. Group Training	ditto		25000
5. Fellowships	ditto	9 m/m	36000
6. Supply of Reagents	ditto	all year	7000
TOTAL			U\$ 120000



**YEAR I (1997)**

1.	Adv. WS on Labelling of biomolecules	Thai/OAEP Malaysia/MINT	2 weeks	20000
2.	Adv. WS on Radiopharmaceu tical kits technology	Indonesia/Serbong China/NPIC	2 weeks	20000
3.	Ws on <sup>99m</sup> Tc generator technologies	Vietnam/DALA	2 WEEKS	20000
4.	Expert Services	Participating countries	1m/m	13000
5.	Group Training			25000
6.	Fellowship	ditto	3m/m	13000
7.	Supply of reagents	ditto	all year	9000
8.	2nd. Counter- parts' Meeting	Seoul/Korea	end of 1997	20000
			Total	U\$ 140000



**Project Title:** The use of isotopes in studies to improve yield and N<sub>2</sub> fixation of grain legumes with the aim of increasing food production and saving N-fertilizer in the tropics and sub-tropics of Asia (RAS/85/045).

**Project Description:** The project is a co-operative venture within RCA Member States and is designed to use isotopes and nuclear techniques in research aimed at increasing the nitrogen fixation capacity and yield of grain legumes in Asia. The project is being executed as a Co-ordinated Research Programme (CRP). Technology transfer is also a major objective and is being approached through workshops, training courses and fellowship training for participating scientists and collaborators. Also, for maximum effect, the project is being tackled through interdisciplinary research involving Microbiologists, Agronomists and Plant Breeders working together as a group.

**Participating Member States:** Australia, Bangladesh, China, India, Malaysia, Pakistan, Philippines. Sri Lanka, Thailand and Viet Nam.

**Project Officer:** S.K.A. Danso

**Major Activities and Achievements in 1994:**

1. Project Evaluation Mission to the Philippines, Malaysia, Thailand, Bangladesh and India, October - November 1994
2. Research Co-ordination Meeting, India, November 1994
3. Report of Evaluation Mission, December 1994.

**Time-table for Planned Activities in 1995:**

1. Terminal Tripartite Review Meeting (RCA), March 1995
2. Compiling results of participants for publication, June-August 1995

# **UNITED NATION DEVELOPMENT PROGRAMME**

**Bangladesh, Peoples Republic of China, Philippines, Malaysia, Sri Lanka,  
India, Pakistan, Thailand and Vietnam**

## **INCREASING THE YIELD AND NITROGEN FIXATION CAPABILITIES OF COMMON GRAIN LEGUMES**

**RAS/89/045/A/01/18**

**Extract from the**

### **REPORT OF THE EVALUATION MISSION**

**Mission Members**

**November 1994**

**Dewa Made Tantera, UNDP  
Kumar Rao, IAEA/ICRISAT  
Kauser Malik, IAEA/Pakistan  
David Herridge, IAEA/Australia**

## FOREWORD

An Evaluation Mission Team, comprising Dr Dewa Made Tantera, Dr Kumar Rao, Dr Kauser Malik, and Dr David Herridge was assigned to review achievements of UNDP/FAO/IAEA Project RAS/89/045 "Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes in Asia". The Team travelled to five countries (Philippines, Malaysia, Thailand, Bangladesh, and India) between 16 October and 16 November 1994. For the majority of the trip, the Team was accompanied by Dr Seth Denso, IAEA Technical Officer in charge of the Project. The report filed in this document deals essentially with Project RAS/89/045. However, a second project (RAS/5/021) co-sponsored some activities, particularly training and laboratory assistance, which were noted.

Project RAS/89/045 will terminate on 31 December 1994. Because this report represents a final evaluation of RAS/89/045, we considered it appropriate to speculate on some of the future directions in BNF research and possible UNDP and FAO/IAEA involvement. While it was necessary to identify specific Project achievements, we found it very difficult in practice since in-country field activities associated with RAS/89/045 and other agency projects often overlap.

The Evaluation Mission Team comprised:

Dr Dewa Made Tantera	Team Leader, representing UNDP Centre for Agro Socioeconomic Research J. Ahmad Yani 70, Bogor 16161 INDONESIA
Dr Kauser A. Malik	National Institute for Biotech. & Genetic Engineering P.O. Box 577, Faisalabad PAKISTAN
Dr J.V.D.K. Kumar Rao	ICRISAT Patancheru P.O. Andhra Pradesh 502 324 INDIA
Dr David F. Herridge	NSW Agriculture Tamworth Centre for Crop Improvement RMB 944, Tamworth N.S.W. 2340 AUSTRALIA

We were accompanied on the Mission by Dr Seth Danso, FAO/IAEA Technical Project Co-ordinator of the CRP under review.

## 1. EXECUTIVE SUMMARY

The Evaluation Mission Team reviewed the implementation and outcomes of UNDP/FAO/IAEA Project RAS/89/045 "Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes in Asia". The Project was commenced on 1 January 1990, will terminate on 31 December 1994, and had the specific objectives to:

- (i) Increase N<sub>2</sub> fixation and grain yield of target legumes

It was expected that 10-30% increases in N<sub>2</sub> fixation of the target legumes (soybean, mungbean, groundnut, chickpea, cowpea) would be achieved by adoption of improved management practices, e.g. inoculation with selected rhizobia (the bacteria that infect the roots of the legumes and 'fix' the atmospheric N<sub>2</sub> gas into plant-available forms), phosphorus fertilization, and by selection of cultivars able to symbiose more effectively with promising rhizobia. Grain yields were expected to be increased by 20-50%.

- (ii) Transfer the technology of isotope and nuclear techniques to scientists and technicians in the participating institutes

This technology (i.e. <sup>15</sup>N isotope dilution) would be critical for assessing legume cultivars, rhizobial strains and management practices for enhanced N<sub>2</sub> fixation.

Contract holders were drawn from Malaysia, Philippines, PR China, Thailand, Bangladesh, Pakistan, Sri Lanka and Vietnam. Agreement holders were from India and Australia. The general approach used in the program was to screen existing cultivars for biological N<sub>2</sub> fixation (BNF) and/or yield, or to use breeding and mutation techniques to create diverse material for screening. Additionally, strains of rhizobia were also screened for effectiveness in BNF. Where cultivars had one but not both desired traits (i.e. yield and BNF), crossing and backcrossing followed. Where possible and appropriate, the <sup>15</sup>N isotope dilution technique was used to assess BNF.

The Project implementation was under the control of Dr S K A Danso, IAEA Technical Officer, who recruited short-term Expert Consultants for 1-3 week periods as required, for providing technical expertise during country visits and workshops. Technical Backstopping has been done by Dr Danso. Four research co-ordination meetings (RCM's) were held between 1990 and 1993. They were in Pakistan (1990), Thailand (1991), PR China (1992) and Australia (1993).

The Evaluation Team visited five contracted member countries (Philippines, Malaysia, Thailand, Bangladesh and ICRISAT/India) prior to attending the final RCM of the Project at ICRISAT Asia Center, Hyderabad, India. An additional four countries (China, Pakistan, Vietnam and Sri Lanka) were involved in the Project but were not included in this Mission. However, Contract Holders from those countries participated in the RCM at ICRISAT, thereby providing the Evaluation Team with opportunities to discuss their Project activities.

The Project was timely, because of the general realization that nitrogen (N) deficiencies in the principal food crops (rice and wheat) are widespread, that current agricultural practices are not sustainable and that the grain legumes could play a crucial and expanding role in food protein and in the N economies of cereal production in the future. The immediate objectives of the Project of increasing BNF and grain yield of target legumes through research and transferring isotope and nuclear technology to participating institutes were satisfactorily met. The training programs (Pakistan, Thailand and Australia) were dutifully conducted. Fifteen scientists were trained in the use of isotope techniques, and another 20 were trained in the production of *Rhizobium* inoculum. The  $^{15}\text{N}$  isotope dilution technique was used effectively in the Project to quantify BNF and to evaluate both strains of rhizobia and plant genotypes. The research was of practical use from the point of view of sustainable agriculture. The Project has had a major impact on the production and use of *Rhizobium* inoculants in Bangladesh and, to a lesser extent, in Thailand.

The Project has been instrumental in developing inter-institutional collaboration across the region. It has encouraged and facilitated the exchange of experimental results, plant cultivars, bacterial cultures, and ideas among the participating countries. The development of each country's isotope and inoculant technology has organized by the country itself indicating an effective TCDC approach.

The Project has fulfilled its obligations, met the demand of its target beneficiaries, and has been well accepted by the contracted member countries. The Evaluation Team concluded that a follow-up project should be prepared, with an increased emphasis on the role of well nodulated, high BNF legume cultivar in a cereal-based cropping system. Additionally, the IAEA should take initiative to maintain linkages with Project scientists after the termination of the Project, in order to ensure the continuation of activities until a new/replacement project is underway. Finally, the Team concluded that further gains could be made by promoting the use of BNF in each country and increasing the research and extension efforts. Agencies such as UNDP and FAO/IAEA could be of assistance in this by providing funds and resources.

### **3. TERMS OF REFERENCE**

The evaluation mission was requested to visit five countries participating in the Project and attend the final RCM in order to evaluate achievements and outcomes and to submit a report to the sponsoring organization.

The terms of reference for the Evaluation Mission are as follows:

1. To determine the relevance of the project and its results for sustainable agriculture as UNDP defines it.
2. To determine whether the immediate objectives were achieved totally or partially and determine the extent and timeliness of each of the activities in contributing to the result.
3. To assess the responsiveness of the project management to any changes in the project environment.
4. To assess the effectiveness of the project support provided by all parties to the project and project monitoring.
5. To determine whether the approaches used for achieving each immediate objective worked as expected and yielded the anticipated results, including the linkages and support given to national organizations and industries.
6. To determine the extent to which the organizations involved in the research and development activities have absorbed the transferred technology and their capability to provide the necessary information to the ministry of agriculture and non government extension services (for example companies marketing rhizobium inoculant on a commercial basis) and the farmers.
7. To determine how these organizations use the technology and how well it is understood by each.
8. To determine the extent and the effectiveness of these organizations in supporting national authorities and local industry in information.
9. To assess the impact of this project on the total national effort towards the transfer of technology in this field.
10. To determine the extent of the increased use of rhizobium inoculants.
11. To assess whether at the end of the project there is adequate capability and capacity nationally for long-term technical backstopping in the technology.

In order to answer these questions the Evaluation Team Member sought information in each of the five countries on the scientific and technical outcomes of the Project, scientific activities planned for the immediate future, extent to which the isotope technology has been and will continue to be used, technical information flow from



contracted institutes to other country organizations, use by farmers of inoculants and impact of the Project on production and use, and the long-term technical support capacity in each country for isotope and inoculant technology. Terms of Reference 2, 6, 7, 8, 9, 10, and 11 are considered in Section 5. *Project Results*.

The Terms of Reference 1, 3, 4 and 5 deal with the relevance, structure, organization and administration of the Project. These are dealt with under Section 2. *Project Concept & Design*, Section 6. *Project Implementation* and Section 7. *Conclusions*.

#### **4. CONDUCT OF EVALUATION**

The Evaluation Mission Team was made up of four members - Dr Dewa Made Tantera (team leader), Indonesia, representing UNDP and Dr David Herridge, Australia, Dr Kumar Rao, India and Dr Kauser Malik, Pakistan, Technical Experts contracted by IAEA. The combined experience of the team included project management & formulation, research leadership, plant pathology and BNF research in the disciplines of microbiology, biochemistry, physiology, agronomy, genetics and breeding.

The Evaluation Team visited five contracted member countries between 16 October and 16 November 1994 (Philippines, Malaysia, Thailand, Bangladesh and India) and attended the final RCM of the Project at ICRISAT Asia Center, Hyderabad, India. An additional four countries (PR China, Pakistan, Vietnam and Sri Lanka) were involved in the Project but were not included in this Mission. However, Contract Holders from those countries participated in the RCM at ICRISAT, thereby providing the Evaluation Team with opportunities to discuss their Project activities.

While the entire team visited Thailand, Bangladesh and Malaysia, only three members visited the Philippines (Malik, Kumar Rao and Tantera) and India/ICRISAT (Herridge, Kumar Rao, Tantera). Dr S K A Danso, RAS/89/045 Project Officer, IAEA, Vienna accompanied the Evaluation Team for the majority of the Mission. Dr Danso did not visit the Philippines.

The Mission Itinerary and the list of persons met during the country visits are in Appendices A and B.



UNITED NATIONS DEVELOPMENT PROGRAMME  
REGIONAL BUREAU FOR ASIA AND THE PACIFIC  
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## F A C S I M I L E

<b>To:</b> Mr. John F. Easey RCA Co-ordinator Austria, Vienna	<b>Date:</b> 24 January 1995	
<b>From:</b> Willi Scholl Regional Programme Manager RPD/RBAP, UNDP, New York	<b>Fax No:</b> 43-1-230-9633	
<b>Subject:</b> RAS/89/045 - Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes	<b>Signed:</b> <i>Willi Scholl</i> <b>File:</b> RAS/89/045	<b>Pages:</b> 2

We have reviewed the Report on the final evaluation of the project in reference. We understand that the evaluation team headed by Mr. Dewa Made Tantera has been visiting the Philippines, Malaysia, Thailand, Bangladesh and ICRISAT/India in order to evaluate the achievements and outcomes of this UNDP supported project.

In principle, we are satisfied with the report and would like to offer you below some comments on its content:

1. We note that the immediate objective (i) of the project i.e. increase N<sub>2</sub> fixation and grain yield of target legumes has been satisfactorily met.
2. We also note that the training programmes (Pakistan, Thailand and Australia) have been dutifully conducted.

Overall, the report conveys the message that the project's activities were of practical use in terms of enhancing practices in support of sustainable agricultures in the participating countries.

Regarding the recommendations made by the evaluation team, we would particularly like to draw your attention to No. 2 - i.e. that IAEA should take initiative to maintain linkages with the project scientists after the termination of the project. This is very important in order to ensure some degree of project sustainability in the participating countries. We also support the recommendation No. 3 - i.e. that IAEA should consider contracting one of the country institutions to coordinate follow-up activities e.g. the BNF Resource Centre, Bangkok.

You are aware of the current financial constraints concerning the funding of new project activities. Moreover, there are some uncertainties as to the thematic scope of the Sixth Programming Cycle which will should be clarified during UNDP's Executive Board meeting in July of this year. We therefore cannot, at the present time, make any commitment for follow-up to the current project. We will inform you in due course whether there are any possibilities to provide new funding for a similar type activity.

With best regards.

**Project Title and Number: Public Acceptance of and Trade Development in Irradiated Foods (RAS/0/022 under RPFI Phase IV)**

**Project Description:** (i) To facilitate public awareness and understanding of the economic/trade and public health benefits offered by food irradiation through several public information seminars throughout the region, and (ii) to foster market development and intra- and interregional trade in irradiated foods through regional workshops on market testing and the provision of expert assistance in market development and trade.

**Participating Member States:** Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

**Project Officer:** G. G. Giddings

**Major Activities and Achievements in 1994:** (a) A coordinated research program on public acceptance and trade development in irradiated foods was approved for four years, and research agreements have been concluded with at least one institute in each of the participating countries, and (b) arrangements were made with the organizers of the World Spice Congress, to be held at Cochin, India in February, 1995, to include a special session on spice during the Congress and to put on a workshop on spice safety and hygienic quality and the role of irradiation immediately following the Congress. This focus on the role of irradiation in expanding inter- national trade in high quality, safe, value-added spices is the first phase of a project to improve the safety and quality of food and food ingredients in trade by irradiation. These two events at Cochin plus a national seminar on food irradiation at Bombay the same week as the workshop are already organized and coordinated with the sponsoring entities and the participants. Additionally, regional public information seminars and workshops on acceptance of and trade in irradiated foods are in the planning and organizational stages.

**Activities planned for 1995:** In addition to the above-mentioned events at Cochin and Bombay, India in February, the following events are planned for 1995:

(1) A one-week regional RCA Workshop on Market Testing of Irradiated Food, Beijing, China in May-June,

(2) A one week coordination meeting under the scope of the above-mentioned CRP at Manila, Philippines in September, and,

(3) A Seminar on Public Information on Food Irradiation at Seoul, Republic of Korea during three days in September (tentative).



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**International Consultation on the NARS Vision of  
International Agricultural Research  
Rome, 12-14 December 1994**

**New Paradigm of Agricultural Research for Sustainable Food Security  
in the Asia-Pacific Region**

by  
M.S. Swaminathan and K.N.N.S. Nair

December 1994





## NEW PARADIGM OF AGRICULTURAL RESEARCH FOR SUSTAINABLE FOOD SECURITY IN THE ASIA-PACIFIC REGION

### *Hunger persists amidst plenty*

Food production and calorie supply in the developing countries of the Asia-Pacific region not only kept pace with, but even surpassed, population growth during the past four decades (1960-90). Food production per capita also increased. Some countries in the region which were food-importing and food-aid dependent during the sixties, such as India, have achieved self-sufficiency and attained the capacity to maintain comfortable food reserves to meet contingencies arising from natural calamities (2). Despite significant progress in food production and fairly adequate food supply to meet the demand during this period, chronic hunger with below minimum-acceptance levels of livelihood security, persisted among a quarter to one-third of the population in the region and their numbers continue to remain disturbingly high (3) (4).

### *Food security redefined*

Conventionally, food security is defined as the balance of food supply (mainly cereal supply) and effective demand for food, otherwise termed food self-sufficiency, within a territorial entity, usually the country. Availability of food is a necessary condition, but not a sufficient one to ensure food security for all, because those who cannot afford to buy food are left hungry and undernourished (5). Recognising the composition, access and spatial dimensions, food security is defined as 'livelihood security for the households and all members within, which ensures both physical and economic access to balanced diet, safe drinking-water, environmental sanitation, primary education and basic health-care.

### *Poverty and food-insecurity*

Poverty is the primary cause of hunger, and of chronic food insecurity. Its origins lie in the interaction of many factors: the apportionment of productive assets, particularly land and human capital, socio-cultural values, national development strategies, institutional development and international markets for trade and finance.

### *The poor and the food-insecure*

Two main groups constitute the undernourished or food-insecure. First, those who live in poorly resource-endowed areas such as the degraded regions, the mountainous countries, the tribal areas etc. where poverty is still pervasive. The second group belongs to the resource-endowed areas who have little or no assets to fall back on, such as the landless, rural artisans, and even small farmers with extents of land but not enough to make a living. Iniquitous asset distribution is the prime cause of poverty and food insecurity. Countries in the region which have accomplished greater equity in the asset distribution have also succeeded in making a dent into poverty. And the reverse is true of those countries which

have failed to bring about equity in the ownership of assets, not only land but other forms of productive assets. Degradation of the environment, especially in the quality of the common property resources, has further aggravated the problems of the poor, particularly women.

### *Demand and supply scenarios*

Population in the region is growing, although a slower rate is expected in later years (6). Further, the rural and urban composition of the population would change in favour of the latter - from one fifth in 1960, to over one half by 2025 (7). The increase in total population as well as in its urban component and anticipated improvements in income arising from economic development, would considerably increase the demand for food in the region, both in quantity and quality.

Projections for various time horizons indicate that market demand for foodgrains could be met mostly from production within the countries in the region and some imports from outside. As decades roll on, the gap between market demand and availability of food from within the countries in the region will be widening and this in turn will necessitate increased imports (8). But if food security for all is to be ensured, the gap would be widened to disquieting proportions (9).

### *Concerns and constraints*

Much of the increase in production in the Asia-Pacific region arose from enhanced productivity rather than expansion in area (10). The per capita availability of arable land is dwindling steadily, largely due to the incessant increase in population (11). Cereal productivity improvements in the region during the last decade have been achieved largely through the use of scarce resources like water and high-energy external inputs such as fertilizers which are leading to biotic and abiotic stresses on the resource base (12)(13)(14)(15)(16). Further, the growth rates of rice and wheat, the two major staples in Asia, have started showing a declining trend, signalling the setting in of 'fatigue' in the green revolution which is creating some anxiety (17). The long-term sustainability and further spread of the intensive food production systems such as rice-wheat rotation practised in the temperate and sub-tropical Asia (Indo-Gangetic plains), and the maize-winter wheat rotation in the temperate Asia (Northern China plains) are proving increasingly difficult due to stagnant yields and to resource stress, among others (18).

Although the agricultural growth registered in the region outstripped population growth, the share of agriculture in the GDP (Gross Domestic Product) declined significantly over the last three decades (an otherwise desirable indicator of economic development) (19). At the same time, dependence on agriculture as a source of employment has not registered any commensurate decline, with the result that the rural population in the region has to be content with a smaller share of the GDP which, in turn, is encouraging migration to urban areas (20). The situation is likely to continue in the foreseeable future, especially in South Asia (21).

## Potentials and opportunities

Even though the resource base (in terms of land and water) is shrinking, agriculture in the region is dynamic and resilient. Untapped or under-utilized potential, both in technology and resources, do exist in the region. Through a well-orchestrated, mutually reinforcing package of green technologies, services, and public policies, it should be possible to produce food for all in the region, certainly for the medium term (2010). The yields per hectare of crops achieved, especially rice, the major source of calories, vary considerably between nations and ecosystems in the region (22). Many countries in the region have a long way to go in order to catch up with those countries that have made advances in increasing productivity (23). The current yield gap is not so much between the farmers and experimental stations as between the top one-third and the remaining two-thirds owing largely to differential adoption of technologies and use of inputs (24).

The potential for increasing the output of rice in the region through increasing the consumption of fertilizer is considerable because its consumption is still very low in many countries, and the prevalence of a favourable grain-nutrient ratio makes fertilizer use still profitable in these countries (25). Arable lands in the region are subjected to a variety of abiotic stresses, such as top soil erosion, alkalinity, salinity, etc., and variations in production environments such as floods, drought, erratic rainfall, etc (26). If technologies for sustainable use are developed, and the required investments made, to stabilize the production environment and put back into production, these land resources could make a significant contribution in ensuring food security, both by augmenting production of food and by creating employment to gain access to the food produced. Significant breakthroughs in agricultural technology are on the anvil. Already hybrid technology has opened up new vistas in increasing the productivity of cereals, especially rice and maize (27) (28).

After reaching the frontier and remaining stagnant, there are signs of a newer breakthrough in the genetic potential of rice (29). In addition, Asian agriculture possesses certain distinct advantages. Firstly, the Asia-Pacific region is endowed with a rich ecosystem diversity which provides multiple opportunities for intensification and diversification. Secondly, as a consequence of the rich ecosystem diversity, the region is rich in species diversity and makes it a rich 'genetic estate' whose value is enhanced by the recent developments in genetic engineering. Thirdly, its abundance of labour is an opportunity, rather than a liability, for the introduction and spread of frontier technologies.

## Food security challenges

In the context of continued increase in population of diversification of food habits arising from accelerated urbanisation and rising incomes, of diminishing land, fresh water and genetic resources, of expanding biotic and abiotic stresses, of inadequate investment in rural techno-infrastructure and an inequitable trade environment, and of insufficient growth in household income arising from slow growth in diversification of gainful employment opportunities, the twin food security challenges faced by the Asia-Pacific region in eradicating endemic hunger are:

not only that of maintaining the availability of food through production from countries within the region,

but also that of expanding economic access to food, thereby ensuring food security for all, at household level.

Dependence on production from within the countries in the region rather than import by predominantly agricultural and rural developing countries is desired as the food-insecure populations need income through employment generated in the production of food, and not just physical availability of food.

### **Possibilities and opportunities**

The untapped yield reservoir existing at current levels of technology as reflected in the differences in yield between the top one-third and the remaining two-thirds, rather than the best farmers and the research stations, the under-utilised potentials of biophysical resources as observed in the variation in yield between well-endowed and poorly-endowed ecosystems; the rich ecosystem diversity and the possibilities for intensification and diversification, and the remarkable success attained in dealing with specific aspects of food security through well-orchestrated, mutually reinforcing package of green technologies, services and public policies, in various countries, are some of the opportunities with which the Asia-Pacific region is endowed in ensuring food security. Capitalising these opportunities would give the region the badly-needed breather to reach a balance between food production capacity and the demand beyond the medium-term. In the long run, the prospect of a deceleration in production setting in as a result of ecological factors, such as depleted soil, exhaustion and pollution of groundwater and surface water resources, genetic erosion, the accumulation of greenhouse gases in the atmosphere, and the depletion of the ozone layer, need to be countered by a demand contraction, primarily by defusing the population pressure through stabilising the numbers, which is not expected earlier than the first quarter of the next century.

### **New paradigm of agriculture and rural development**

The explicit recognition that both physical availability (production) of, and the economic access (entitlement) to, food are essential determinants of the food security challenges of today and tomorrow in the Asia-Pacific region, demand a reorientation of development strategies in a such a way that the quality of human life is improved while living within the carrying capacity of supporting ecosystems. This calls for the promotion of a new paradigm of agricultural and rural development, based on the integrated application of the principles of ecological sustainability, economic viability, and social equity, both in terms of gender and economic status.

### **Strategies for ensuring food security**

Sustainable availability of food, adequacy of household income and food entitlements to the food-insecure are the key strategies required to ensure food security for all.

Sustainability of food availability is to be achieved through building the production capabilities of the resource base and minimising environmental and economic costs through interventions that ensure economic viability, environmental compatibility and social equity, such as integrated management systems for nutrients, energy and pest control, and conservation of genetic resources for biodiversity supported through resource-friendly land-use systems and policies, user-friendly water management systems and policies.

Adequacy of household incomes to secure access to food is to be attained by employment generation and asset-creation through the integrated use and management of biophysical (land and water) and human resources to maximize income and employment by:

bringing about a systems perspective in agricultural development, backed with policies and investment in research, delivery systems, support services and infrastructure, by shifting commodity-focus to resource-focus in the planning process;

promoting farming systems which maximise net income per unit of land, water and energy, and not merely output per unit of land through diversification of products, plus value addition through the integration of production, processing and marketing within and outside the farm; and

sustaining the productivity, employment and income potential of the common property resources through rehabilitating investment and management systems to monitor resource use and equitable sharing of usufruct.

### **The challenge for agricultural research**

The emerging challenges in the areas of environment, employment and equity, both in gender and economic terms, for ensuring sustainable food security for all, call for a new paradigm of agricultural research that fosters a job-led agricultural growth strategy by developing technologies which are environmentally sound, economically viable, employment-intensive and socially equitable. both in gender and economic terms.

### **NARS vision for the Asia-Pacific region**

The new paradigm of agricultural research sets a new vision for the NARS in the Asia-Pacific region. it encompasses:

bringing in a systems perspective in agricultural research by changing the commodity focus to resource focus, so as to maximise output, income and employment in a sustainable manner, at minimal environmental and economic cost, for the given resource entity;

fostering farmer-centred participatory research, based on the integration of the ecological prudence and employment intensity of traditional farming systems, and the production potential, cost-effectiveness, consumer appeal and tools of frontier technologies;

extending support to small farm agriculture by promoting the intensification and diversification of the principal food-based farming systems in an environmentally and socially friendly manner, so as to maximise income and employment;

augmenting the income-earning capacity of women in the farming systems and reducing the drudgery of women's work on the farms;

generating global coalition for harnessing science and technology for international public good in the areas of sustainable food security, environment protection and poverty alleviation;

sharing responsibilities and commitments between the research systems at international, regional, national and sub-national levels, so that all the systems complement each other rather than be competitive; and

ensuring support commensurate with commitments for national and international agricultural research systems designed to promote public good.

### **Agenda for research and action for the Asia-Pacific NARS**

The new vision for NARS in the Asia-Pacific region sets the agenda for research and action. This vision emerges from the new paradigm of agricultural research which seeks to resolve the twin concurrent, prime, concerns of food security, viz. making food available to meet the demand and to ensure economic access to food for all. The basic desideratum for the NARS is set by the new paradigm that the innovations and interventions are rooted in the principles of economics, ecology and equity. So also the need for minimising the economic and environmental costs to make food available at prices affordable to the resource-poor, while encouraging the producer to augment production.

Within the framework of the new vision outlined above, the research agenda should include long-term vision and short- medium-term priorities. In addition to germplasm conservation and management, natural resource conservation, policy research and global information systems, the long-term programmes should include capacity-building and the provision of research support services to NARS. Such services should include the organisation of research networks, training programmes and institution-building. Against the grim scenario of a shrinking resource-base for food production (land and water), in the aggregate as well as per caput - due to increase in population in most countries in the region, especially in the most populous countries such as China and India - a priority in the short-medium-term is to ensure increasing food grain yields, faster than the growth in demand,. While permitting no let-up in commodity focused research, a second front of research concerns with focus on resources has to be opened. The generic concerns that need consideration to ensure food security for all include:

1. The commodity-centred research has led to bypassing the poorly-endowed and vulnerable resource systems such as mountain regions, coastal regions, tribal belts etc, thereby denying opportunities for agricultural development in these areas. In the absence of a conducive biophysical resource base, these areas are unable to take advantage of the fund of knowledge created through commodity-centred research. These are the very areas that account for much

of the poverty and food-insecurity in the Asia-Pacific region (30). Research programmes are to be reformulated on the basis of ecosystems to identify opportunities for developing such resource-scarce areas.

2. In resource-centred research, the focus should be on the development of total resource systems, biophysical as well as human, individual as well as common property resources, with the set objective of maximising income and employment sustainability from the resource complex rather than maximising the productivity of specific commodities, by producing multiple products (crops, livestock, fish and trees) and by value addition through product conversion.
3. Development of farming systems for the sustainable livelihood security of the resource-poor households through maximising income and employment by increasing the productivity of resources, by intensification and diversification of resource use (cropping, livestock rearing, aquaculture, horticulture, agroforestry etc.) and by value addition through product conversion and on-farm processing.
4. Technology - especially post-harvest technology - for the generation of income and employment in the rural areas, through rural industries based on local resource and value addition by linking production with processing and marketing.
5. Developing alternative resource use and management systems, and supporting infrastructure to replace resource degrading practices such as shifting cultivation and slash and burn cultivation, as well as degraded lands such as common property resources, and arable lands subjected to abiotic stresses such as soil erosion, alkalinity, salinity, etc., categorised as 'wastelands'.
6. Increasing income for women through generating new employment opportunities, adding value to time by skill upgrading, and developing tools and equipment and practices which reduce the drudgery of women's work on the farm and in the household.
7. A mandatory monitoring mechanism to assess the impact on women of every intervention and innovation.
8. Forging new forms of linkages, based on the need to promote public good and not just private profit; new forms of partnerships between the international and national research systems and for sharing responsibilities and commitments.
9. Initiating coordinated action at regional and global levels to ensure that the fast-expanding trade-related intellectual property environment does not ignore the need to foster the application of science and technology for national, regional and international public good.
10. Strengthening the national systems of agricultural research through continued public investment in research, technology delivery and support systems, and

institutionalising state support by pegging budget allocation to a proportion of the agricultural GDP.

11. A systems approach to research, extension and development so that all the links in the production-consumption chain receive concurrent and adequate attention. Unless the package of technology is supported by packages of techno-infrastructure, services and public policies with particular reference to assured and remunerative marketing, the technology will make little impact. Too often, there is very little attention given to the substrate conditions essential for technology to strike roots and yield benefits. Developing mechanisms for providing technology delivery and support services through the 'single-window system' should be a part of the agenda. The research agenda has to be reinforced by policy measures. Land use policies, particularly those which will place a restraint on the diversion of prime agricultural land irrevocably to other uses and user-friendly water use and management, including pricing policies to increase efficiency and to conserve these finite resources are of major concern in the countries of this region.
12. No agenda for action will be complete without an effort to inculcate the new vision among scientists and researchers engaged in creating knowledge to alleviate food insecurity. A systems perspective needs to be evolved in which the role of the individual discipline is seen as part of the system. The emphasis in approach should shift from 'what the disciplines can offer the system' to 'what the system needs from the disciplines'. The system concept has to be inculcated from the very beginning of the training by pursuing a farmer/farm-centred approach to agricultural education and research.

#### **Shared commitments and partnerships in agricultural research**

The implications of the new paradigm of agricultural and rural development to ensure food security for all, and the consequent shift in NARS vision that arises from the new paradigm of agricultural research on the one hand, and recent developments such as the Global Biodiversity Convention, the UN Framework Convention on Climate Change, the World Trade Agreement and the Cairo Plan of Action on Population and Development, on the other, necessitate global coalition and the fostering of new forms of partnership for harnessing science and technology for international public good in the areas of sustainable food security, environment protection and poverty alleviation.

The new paradigm of agricultural and rural development with its pro-poor/pro-nature/pro-women orientation, focuses on job-led growth for ensuring sustainable food security for all. It enjoins upon technological innovations to be sensitive to environmental, economic, employment and equity issues, particularly in gender terms.

The new paradigm of agricultural research proposed to meet the challenges of food security engenders a shift and reorientation in the vision of NARS, with emphasis on a systems perspective in agricultural research, farmer-centred participatory research, blending of traditional and frontier technologies, extending location-specific research beyond biophysical conditions to socioeconomic conditions, supporting small farmer agriculture through diversification of farming systems, empowering women, and augmenting rural



employment and income through value addition, necessitates ecosystem-based, micro-level research.

The Global Biodiversity Convention which became operational on December 29, 1993, declares that the genetic wealth occurring in a country is the sovereign property of the people of that country. The UN Framework Convention on Climate Change, which came into force on March 21, 1994, calls on governments to adopt national policies and take corresponding measures on the mitigation of climate change by limiting its anthropogenic emission of greenhouse gases (GHG) and protecting and enhancing its GHG sinks and reservoirs. Both have implications as to being ecologically prudent and their technologies being environmentally friendly.

The World Trade Agreement, signed by over 125 countries at Marrakesh on April 15, 1994, has not only brought agricultural commodities within the scope of the World Trade Organization, but also intellectual goods relating to agriculture. Thus, the Trade Related Intellectual Property Rights (TRIPS) agreement stipulates that every nation should have either a patenting or a sui generis system of plant variety protection. In addition, other clauses relating to sanitary and phytosanitary measures and total aggregate measurement of support in the form of non-product and product-specific subsidies have profound implications for technologies, both at the production and post-production phases of agriculture.

New forms of linkages will have to be developed between public and private sector research institutions and between NARS and the International Agricultural Research Centers (IARCs) to promote knowledge-intensive technologies as public good and not just private profit, since knowledge is increasingly becoming a substitute for land, water and capital. Fulfilling the scientific goals as well as social expectations and fostering location-specific research carried out in a participatory mode, needs new forms of partnership between NARS and rural families.

Unlike in commodity-centred research, resource-focus research is more location-specific and at micro-level. NARS are better placed to deal with the concerns outlined for the 'second front', being more location-specific and micro-level. The IARCs could focus on some of the basic problems of commodities and take a supportive role in training personnel and providing materials, while the national and sub-national systems could concentrate on systems research and resource management. IARCs have a lead role to play in promoting a global coalition to harness science and technology for international public good. They also need to assume a lead role in assisting the international community in implementing some of the goals of the Biodiversity, Climate and Desertification Conventions, as well as Agenda 21 of UNCED and Capacity 21 of UNDP, and in addressing the issues relating to the human supporting capacity of natural resources incorporated in the Cairo Plan of Action of the International Conference on Population and Development.

## ENDNOTE

- (1) Between 1960 and 1990, population grew at an annual rate of 2.1% (South Asia 2.3%, East Asia 1.8%, and South East Asia 2.3%) from 1.53 billion to 2.86 billion. Cereal production during 1961-63 to 1987-90 is estimated to have increased at 3.7% per annum from 332 million tons to 618 million tons. During this period per caput

food supplies increased from 131 kg (equivalent to 1849 calories per day to 183 kg equivalent to 2442 calories). The cereal self-sufficiency ratio improved slightly from 97.9 to 98.1 %.

- (2) During the two decades between 1969-71 and 1988-90, cereal production in the region increased from 332 to 618 million tons (86%), in East Asia from 211 to 409 million tons (94%) and in South Asia from 121 to 209 million tons (73%). A significant increase in cereal production during this period was witnessed in all the major countries in the region. Thus, in China cereal production doubled from 158 to 313 million tons, in India it increased by two-thirds from 90 to 156 million tons, in Indonesia from 15 to 36 million tons (134%), in Bangladesh from 11 to 18 million tons (64%), and in Pakistan from 11 to 19 million tons (79%). The region moved further towards self-sufficiency during this period. The East Asia sub-region maintained its position with 96%, while South Asia surpassed by moving from 98% to 102%. Most of the countries in the region improved the self-sufficiency ratios: China with 98% and 98%, India 98% and 106%, Indonesia 94% and 95%, and Pakistan 96% and 97% between 1969-71 and 1988-90. But for Bangladesh the self-sufficiency ratio declined from 97% to 87%. The daily per capita food availability as a percentage of requirement improved in Central and North Asia from 106 to 114, in South East Asia from 110 to 112, and in South Asia from 96 to 97 between 1979-81 and 1988-90. Figures for the two time periods with respect to China are 104 and 114, for India 96 and 104, Indonesia 110 and 121, Bangladesh 89 and 99, and Pakistan 105 and 110 respectively.
- (3) In the late eighties (1988-90) the chronically undernourished population is estimated at 523 million, which is a little over 19% of the 2704 million population in the Asia-Pacific region. Two decades ago (1969-71) the undernourished numbered 751 million and constituted 40% of the population. By the year 2000, the proportion is expected to decline to 13.9% (583 million out of 3118 million) and by 2010 to 7.9% (272 million out of 3433 million).
- (4) The population of the region during 1988-90 without access to safe drinking water is estimated to be 31%, and without access to sanitation, 43%. By 1990, health care was provided to 74% of the population in South Asia, 77% in South East Asia and 91% in East Asia; drinking water to 68% in South Asia, 53% in South East Asia and 83% in East Asia; and sanitation to 23% in South Asia, 48% in South East Asia and 97% in East Asia.
- (5) In the mid-1980s 72% of the world's poor and 66% of the world's extremely poor lived in the Asia-Pacific region. Of the total population, 32% were poor and 18% extremely poor. Over the years, the proportion of poor people has declined in this region. But in absolute numbers, it is staggering, with 560 million poor and 280 million absolute poor.
- (6) In 1960 the Asia-Pacific region accounted for 49.8 percent of the global population and half a century later, in 2010 the share of the region is expected to increase to 53 percent, and by-2025 to decline to 51.7 percent. But in numbers the population is estimated to double to 3.8 billion in 2010 and triple to 4.4 billion in 2025 from 1.5 billion in 1960. Between 1970 and 1980 the population in South Asia grew at an

annual rate of 2.3%, in 1980 and 1990 at 2.4%, and is estimated to grow between 1990-2000 at 2.2% and 2000-2010 at 1.8%. The corresponding figures for East Asia are 1.9%, 1.5%, 1.5% and 0.9%.

- (7) Urban population accounted for only 19% of the total population in 1960, which rose 31% in 1990 and is expected to rise further to 41% in 2000.
- (8) In the year 2000, for an expected population of 3144 million, demand is estimated at 830 million tons of foodgrains and production at 811 million tons, leaving a deficit of 19 million tons. In 2010, a population of 3729 million would demand 959 million tons of foodgrains while the anticipated production is 927 million tons which would leave a deficit of 30 million tons. By 2025, the region's population would be 4.4 billion generating a market demand for food estimated at 1284 million tons but with the capacity to produce only 1157 million tons, requiring an import of 127 million tons.
- (9) For instance South Asia's cereal requirement could be 70% greater than its production level in 2025, if hunger is to be eradicated in this sub-region. To feed South Asia's over 2 billion population in 2025, the total cereal requirement estimated is 610 million tons of which 400 million tons are to meet the market demand and 210 million tons to eliminate hunger. The anticipated production from within the region is only 355 million tons which leaves a gap of 255 million tons (70% of production) as against 46 million tons (17% of production) if only the market demand were to be met.
- (10) Between 1966-70 and 1976-80, the annual growth rate of cereal production in Asia (excluding China) was 3.0%. The area increased by 0.7% and yield by 2.3%. For China, the corresponding figures are 3.8%, 0.2% and 3.6%. While between 1979-81 and 1989-91 cereal production in Asia (excluding China) increased by 2.6% per annum. All of this came from yield which increased at the annual rate of 2.7%. In fact, the area declined by 0.1%. The trend for China was the same, with cereal production registering an increase at the rate of 3.1% per annum. While yield increased by 3.3%, area declined at the rate of 0.2% per annum. The same trend was observed in India, the other major country in the region. During 1981-91, total cereal production in India increased at the rate of 3.3% per annum. While cereal yields increased at the rate of 3.5% per annum, the area under cereals declined by 0.2%.
- (11) Per capita availability of crop land in the region declined from 0.22 hectares in 1970 to 0.18 hectares in 1980 and 0.16 hectares in 1985. The ratio of agricultural land to agricultural population expressed in per caput declined from 0.25 ha in 1980 to 0.23 ha in 1990. In contrast, the ratio improved in the developed countries in the region: Australia from 43.62 ha to 57.42 ha, Japan from 0.39 to 0.61, and New Zealand from 1.29 ha to 1.33 ha.
- (12) The share of irrigated land to agricultural land in the region for 1989 was 19.8% (27.5% in South Asia). The rate of growth of irrigated area has been 1.9% per annum between 1965 and 1989. Of late, the rate is decelerating. Between 1980 and 1990, the average annual growth rate in irrigated areas was only 1.2% and the proportion of irrigated areas to total agricultural land increased only from 30.8% to

34.4% (121 to 137 million ha of land). Annual withdrawal of water for agriculture has reached 478 cubic meters per capita in 1990, which is a little over 10% of the per capita internal annual renewable water resource of 4 684 cubic metres.

- (13) Fertilizer consumption in the region registered an annual growth rate of 10.1% between 1965 and 1989. The consumption of fertilizer in the region nearly doubled between 1980 and 1990 from 27 to 51 million tons, and from 69 to 129 kg per hectare of agricultural land.
- (14) Between 1965 and 1989, land put to agriculture in the region increased at an annual rate of 0.24%. During the same period, area under pasture declined by 0.21%, and forests and wood lands at a higher rate of 0.48% per annum.
- (15) Human-induced soil degradation in Asia as estimated in the ISRIC/UNEP study of 1990, puts a total of 452 million hectares (a quarter of the agriculturally-used land) as moderately to excessively affected, classified as 317 million hectares due to water and 90 million hectares to wind erosion, 41 million hectares to chemical and 6 million hectares to physical degradation.
- (16) A 1991 study places the extent of desertification/dryland degradation at 70% (1 310 out of 1 880 million hectares) in Asia and 54% (380 out of 700 million hectares) in Australia. Notwithstanding the growing consensus that the area affected by desertification has been greatly overestimated, largely arising from methodological weaknesses, and growing recognition that drylands are much more resilient to drought and to human abuse than previously thought, the threat from desertification/degradation cannot be belittled since only 39% of the 1982-84 cereal production in Asia (excluding China) was contributed by irrigated lands while the rest came from rainfed lands. This assumes greater significance as these areas are more vulnerable to aberrations in climate and hence to food insecurity.
- (17) Between 1966-1974, the growth rate of rice production in Asia registered 2.1% per annum, which increased between 1974 and 1982 to 2.6%, but declined between 1982-1988 to 1.9%. Similarly, production of wheat registered an annual growth rate of 4.1% between 1966 and 1974, increased further to 4.4% between 1974-1982, but declined to 2.7% between 1982-1988.
- (18) Rice-wheat rotation (rice preceding wheat in the upper Indo-Gangetic plains, and wheat succeeding rice in the lower Gangetic plains) spread very fast in the sub-tropical Asia during the decade between mid-1970s and mid-1980s. Rice area in India Punjab tripled between 1975 and 1987. The sustainability of the system is increasingly doubted on account of the stagnant or even decreasing tendency in yields for large parts. Apart from the increasing input costs, decreasing soil fertility and lower market prices, the inherently opposing agronomic requirements (well-aerated root zone for wheat while the top soil needs to be puddled to form a layer of low permeability for rice) and inadequate drainage are restraining the further advance of this practice. The maize-winter wheat system is under increasing threat, due to shortage of water.

- (19) The share of agriculture in the GDP of the Asia-Pacific region declined from 40 % in 1965 to 23 % in 1991.
- (20) The proportion of the economically-active population dependent on agriculture in the region was 70 % in 1970, which declined to 64 % only in 1980 and further to 61 % in 1985.
- (21) The proportion of population economically active in agriculture to the total economically-active population in the Asia-Pacific region continues to be high, even in 1990, with 63.8 % (823 out of 1291 million). Corresponding figures are 63.3 % for the East Asia sub-region, 64.7 % for South Asia sub-region, 67.5 % for China, 66.5 % for India, and 48.5 % for Indonesia. The high dependence on agriculture for employment is likely to continue in the region, even by 2010. Projected figures are: 50.6 % (893 million out of 1 765 million) for the region, 47.2 % for the East Asia sub-region, 56.5 % for the South Asia sub-region, 51.7 % for China, 59.8 % for India, and 31.7 % for Indonesia.
- (22) The yield per hectare of rice varied from 1.4 tons in Cambodia to 7.8 tons in the People's Democratic Republic of Korea, with 5.8 tons in China and 2.6 tons in India in-between. Rice yields in both the humid and sub-humid sub-tropics are around 5 tons per hectare, while it is about 3.5 tons in the semi-arid tropics, 3 tons in humid tropics, and only 2 tons in the sub-humid tropics.
- (23) Japan's average yield of rice at present is six tons per hectare. Japan had reached the current rice yield of Laos and Cambodia as early as 900 AD, the 1.7 tons of India and the Philippines by 1 200 AD, the 2.6 tons of Indonesia by 1900, the 3.5 tons of China by late 1920s, and the 5.5 tons of the People's Republic of Korea by the 1960s.
- (24) Farmers get two to three times higher yields from the modern rice varieties, compared to traditional varieties. Adoption of modern varieties varies from 100 % in China and Japan to less than 20 % in Thailand, Cambodia and Laos. Over 90 % of the rice lands in Pakistan, Japan and China are irrigated, while less than 50 % in India and less than 25 % in Bangladesh.
- (25) Fertilizer consumption for rice varies from practically negligible in Cambodia and Laos to 71 kg per hectare in India, 152 kg in Indonesia, 278 kg in China and 483 kg in the People's Democratic Republic of Korea. The prevailing grain-nutrient ratio is 1: 11,4 against the international fertilizer-paddy price ratio of 2:1.
- (26) One-fifth of the vegetated land in Asia, totalling 746 million hectares, is subjected to human-induced land degradation. They include 204 million hectares due to agricultural mismanagement, 197 million hectares to overgrazing, and 298 million hectares to deforestation. In India alone, it is estimated that 31 million hectares of degraded land categorized as 'wasteland' can be put back into production.

A substantial proportion of the rice lands in the Asia-Pacific region fall in the sub-humid and humid tropics which are subjected to variable production environments and abiotic stress. For instance, South and South East Asia have more than 15 million

hectares of flood-prone rice lands, subjected to various types of uncontrolled flooding and unpredictable combinations of drought and flooding. These lands yield around only 2 tons per hectare. Income from these lands can be increased significantly through developing new varieties, improving nutrient absorption and evolving better resource management systems.

- (27) China has achieved a 2-ton-per-hectare advantage over conventional varieties with hybrid rice which was introduced in 1976. In 1992, hybrids covered more than one-half of the rice area (18.1 million hectares out of the 33.6 million hectares) and accounted for two-thirds of the rice production (119.5 million tons out of a total production of 187.1 million tons). The hybrids yield was 6.6 tons per hectare, against 4.4 tons per hectare for the conventional varieties. The Institute of Agricultural Genetics, Vietnam, has evolved the vegetatively-propagated hybrid rice in 1986 with a high yield potential of 12-15 tons/hectare and having high regeneration capacity.
- (28) The single-cross hybrids of maize in the Republic of Korea and China at present have a high yield potential of 10 tons per hectare.
- (29) Since the development of IR8 in 1966, there has not been a quantum jump in the production potential of rice. A major breakthrough towards the end of the century is on the anvil, aimed at raising the yield potential by 30% to 10 tons per hectare, with the development of a rice plant at the International Rice Research Institute. This new rice plant with modified architecture will have a fewer number of large panicles per plant and eliminate unproductive tillers, which will enable the raising of nutrient efficiency and thereby move the harvest index from the present 0.5 to 0.6.
- (30) The Hindu Kush Himalaya region, spread over Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan, is one of the largest contiguous mountainous stretches in the Asia-Pacific region. The region extends to an area of 3.4 million square km (12% in area of the Asia-Pacific region) and is inhabited by a population of 118 million. The region is most fragile and environmentally very sensitive. The area is engulfed either by countries which are in the least developed category, such as Afghanistan, Bangladesh, Bhutan and Nepal, or identified as the poor parts of developing countries, such as China, India and Pakistan. Even though the Hindu Kush Himalaya region accounts for only 4% of the population of the Asia-Pacific region, it might constitute one-fifth to a quarter of the poor in the Asia-Pacific region.

IC/NV/94.4.02  
Draft

**International Consultation on the NARS Vision of  
International Agricultural Research  
Rome, 12-14 December 1994**

**Recommendations and Resolution from the APAARI Meeting,  
Los Banos, November 1994**

**FUTURE CHALLENGES AND OPPORTUNITIES FOR SUSTAINED AND  
ENHANCED PRODUCTIVITY AND FOOD SECURITY  
IN THE ASIA-PACIFIC REGION**

**NARS VISION**

**EMERGING FROM THE REGIONAL APAARI EXPERT CONSULTATION  
ON NARS VISION**



**FUTURE CHALLENGES AND OPPORTUNITIES FOR SUSTAINED AND  
ENHANCED PRODUCTIVITY AND FOOD SECURITY  
IN THE ASIA-PACIFIC REGION <sup>1/</sup>**

**RESOLUTION**

We the Members of the Asia-Pacific Association of Agricultural Research Institutions (APAARI)

Place on record our deep appreciation of the valuable contributions made by the CGIAR Centres in the generation of the green revolution technology in the past 30 years. We welcome the move to strengthen and restructure the GC System so that it can respond effectively to new and changing priorities of agriculture in the developing countries;

Recall the spirit of Bellagio where the vision of the founding fathers laid the moral and technological ground and made bold commitments for the green revolution which resulted in a quantum jump in food production and saved millions of lives;

Recognize the major investments made by developing countries in strengthening their NARS in the past 30 years and propose that the earlier principle of the CG Centre substituting for weak NARS will be increasingly replaced by one of greater partnership and devolution of responsibility to encourage them to become self and interdependent.

Realise the persistence of hunger and malnutrition coupled with creeping degradation of the life-support systems.

Resolve to work for a second green revolution by raising the genetic yield potential of major food crops and overcoming the emerging yield ceilings, mobilising for this purpose advances in science, especially in biotechnology and molecular biology.

Further resolve to help double food production in the next 20 years in the vast drylands, where most of the poor people in the developing countries make their living, through improving agricultural production by increasing effectiveness and efficiency of moisture conservation and water use, soil fertility restoration, and other relevant technologies.

Underscore the urgency of developing new paradigms in technology transfer and ecological science which lead to the conservation and improvement of the environment while achieving the necessary productivity gains and food increases.

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<sup>1/</sup> Emanating from an Expert Consultation on NARS Vision towards future challenges and opportunities for sustained and enhanced productivity and food security in the Asia-Pacific Region, organized jointly by FAO and APAARI at PCARRD, Los Banos, Philippines, 22-24 November, 1994.

**Recognise** that the CG Centre and others have made significant contributions in the strengthening of NARS through their training programs and other institution building activities, and reaffirm continued support for these activities to equip NARS for future scientific challenges.

**Realize** that with the more widespread use of Intellectual Property Rights, the CG Centres will continue to hold in trust the world's plant genetic resources and make them freely available to scientists in the developing countries, and to all others for the purpose of public good research.

**Commit** to provide more stable and longer term funding support for the CG Centre so that they could produce the technologies which will be needed to resolve the increasingly complex problem of enhancing productivity while preserving the natural resources base.

# **FUTURE CHALLENGES AND OPPORTUNITIES FOR SUSTAINED AND ENHANCED PRODUCTIVITY AND FOOD SECURITY IN THE ASIA-PACIFIC REGION**

## **NARS VISION**

### **Introduction**

1. An Expert Consultation on NARS Vision towards Future Challenges and Opportunities for Sustained and Enhanced Productivity and Food Security in the Asia-Pacific Region was jointly organised by FAO and APAARI at the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), Los Banos, on 22/24 November 1994. Heads of NARS from 14 countries and representatives of seven CGIAR Centres, the World Bank and IFAD, four FAO experts and a number of resource persons participated. Eleven invited papers were presented and discussed.

### **The Challenges**

2. The Consultation expressed deep concern that chronic hunger and poverty persist in the region, especially in South Asia where a quarter to one-third of the population is suffering from hunger and poverty. If the current trends of food production and consumption continue, the region would not be able to meet the projected demand arising from population growth, income increases and urbanization. It noted that the future production goals will be confronted with shrinking cropland areas in this land-hungry region, declining access to forests and biodiversity, degrading natural resources, deteriorating climate and increasing incidence of rural poverty especially in resource-poor areas. The growth rates of major food production systems in the region were declining, signalling the setting in of the fatigue in the "green revolution".

### **The Premise**

3. The Consultation noted that the twin food security challenges faced were increasing food and agricultural production within the countries and expanding the economic access to food. It emphasized that agriculture holds the key to national development, employment generation, sustained growth and poverty eradication in the developing countries. The processes of poverty alleviation, environmental protection and agricultural intensification were inextricably linked, and the synergism among these called for comprehensive adjustments in policies, priority setting, resource development and deployment, and establishment and management of linkages and collaboration at national, regional and international levels.

4. The Consultation expressed satisfaction that even though the resource base was shrinking, agricultural development in the region was dynamic and resilient. Agricultural production and productivity had more than doubled during the past 30 years, yields of major cereals, such as rice, wheat and maize, had tripled and even quadrupled. Several NARS have matured and developed capabilities, including in cutting-edge technologies, and were evolving, developing, transferring and commercializing new technologies. The IARCs, in collaboration with the NARS, had played an important role in ushering in the green revolution in the region.

5. The Consultation observed that extensive, untapped and underutilized potentials both in technology and resources existed in the region, especially its rich ecosystems, biological diversity and the abundant labour force.

### **New Paradigms in Research, Technology Development and Transfer**

6. The Consultation recognized that research and technology is the engine of agricultural growth, and considering the past trend, the Consultation strongly urged that the future research and technology development must be based on the integrated application of the principles of food security, nutritional adequacy, enhanced productivity, ecological and environmental sustainability, economic viability, job security, and social equity both in gender and economic terms. It also recognized that the main determinants of sustainable agricultural development are a sound and stable forward looking and market based policy environment; an eco-sensitive, client-oriented system of research, technology generation, adaptation and dissemination; and a strong institutional framework comprising a growing coalition of national, regional and international centres of excellence, national research systems, extension services and farmer and peoples organizations. It emphasized that in order to have the desired impact on the agricultural sector, research would need to be focussed, demand driven, dynamic and relevant, and its management efficient, cost effective and transparent.

### **New Vision for Research and Technology Development**

7. The Consultation urged that in order to realize the new paradigms, a new or readjusted global vision, which is people-centred, should be developed.

### **The CGIAR Vision**

8. The Consultation commended the eminent role of the CG System in creating the green revolution whose impact was most pronounced in this region. It welcomed the initiative of the CGIAR Chairman and his colleagues in the Group to reform and revitalize the system, and reorient its vision, research agenda, governance and financial arrangements. The Consultation confirmed the continued need for a dynamic and responsive international agricultural research and technology development and transfer system, and of stronger partnership and cooperation with the CG System. It particularly appreciated the emphasis on interdependence of national and international systems, the mutual reinforcement, the envisaged synergism, and true globalization of research and technology transfer.

9. The Consultation underlined that strong NARS would constitute a strong international research system, hence the need for building strong NARS was emphasized. It strongly supported the move for the CGIAR to be more open and appreciated its emphasis on the partnership and catalytic role. In this context, the call for more and more developing countries joining the System to expand the consultative and decision-making process was greatly appreciated by the Consultation. However, it cautioned that in doing so, the informal nature of the System should not be sacrificed.

10. The Consultation agreed with the System's basic premise and supported the scenario two, which states that the developing countries should greatly increase their own food

production so as to largely meet their own needs, including the needs of the poor, investing in agricultural research and development as part of a larger development process.

11. The Consultation greatly appreciated the System's move toward the next "Supergreen Revolution" which must take into account the socio-economic demands of poor households, comprehensive food security, sustainability, resource conservation, equity, and rainfed areas where most of the poor live. The Consultation exhorted the CG System to use molecular biology and biotechnology to break the yield ceilings and to insulate the production systems from biotic and abiotic stresses.

12. While generally agreeing with the vision and principles for the future research, the Consultation felt that there was a need to define these concepts more clearly. Partnership was the most important principle and should be reflected accordingly in words and actions of the System. The Consultation suggested that "partnership" and "ownership" should not be based and judged only in terms of monetary contributions. The contributions of NARS manifested in many different ways, such as human resources, intellectual and technical inputs, genetic resources and other materials and varying logistic supports and services, should be duly recognized.

13. The Consultation suggested that in promoting linkages among concerned actors, the private-public sector link was a timely and welcomed step and should be based on mutual trust and true partnership.

14. The Consultation felt that the term "Subsidiarity" gives a notion of 'hierarchy' and 'subordination', and would be counterproductive to the "partnership" role. The Consultation preferred the word "devolution" over "subsidiarity" and recommended that devolution should be effected through mutual consultation and consideration based on need, opportunity, cost-effectiveness, efficiency, and capacity, and not by default or on an *ad hoc* basis.

15. The Consultation strongly recommended that the devolution of responsibilities and accountabilities to NARS must be coupled with enabling funding mechanisms. An action plan for devolution with clearly defined timescale, resources allocation, responsibilities, etc. should be developed by the NARS and the CG System. APAARI and other such associations/organizations should play an active role in achieving effective and efficient sharing of responsibilities among NARS and the CG System.

16. The Consultation noted that during the past two decades or so several of the NARS in the Region have attained capability for undertaking conventional genetic improvement work and are deeply involved in germplasm enhancement and breeding activities. It recommended that the CGIAR centres should gradually devolve, to the extent possible and feasible, the conventional breeding and germplasm enhancement activities to capable NARS.

17. The Consultation cautioned that, while moving so-called "up-stream", the Group should not lose sight of the "downstream" working and the needs of resource-poor farmers, especially through networking arrangements involving NARS and regional associations/programmes, such as APAARI.

18. The Consultation cautioned that even for "upstream" research, comparative advantages of selected NARS and IARCs should be examined keeping in mind the resources availability. Regional centres of excellence could be developed at selected NARS and their outputs shared freely throughout the region through TCDC arrangements.

19. The Consultation noted that CG System would be giving higher priority to cereal production for assuring food and economic security. But, noting the increasing emphasis on sustainability and nutritional adequacy, international research on selected major legumes and root crops should not be ignored. Further, it recognized that commodity-centred and resource-centred research orientations are not mutually exclusive. In fact, commodity research must be centred around the resources management and the resources are to be managed for commodity and the farm productivity.

20. With the aim of attaining household food security and increasing emphasis on competitiveness and free market system, research and technology for system research and technology for post-harvest handling, value addition integrating product conversion, processing and marketing is yet another priority area which should receive CG's support.

21. The Consultation generally approved the programme approach, the global and eco-regional action programmes and research agenda. In doing so, it recognized that while the NARS will be making greater contribution to the eco-regional agenda, the CGIAR resources including finances should be proportionately allocated to such programmes. In particular, it endorsed the eminent role of CG in information management.

22. The Consultation recognized that increased capabilities and sustainability of NARS, especially human resources, should be high on the agenda of both NARS and the CGIAR. Considering the need for retrained and newly trained human resources in the new and emerging areas and recognizing that a good number of NARS in the Region are still not equipped to meet the increasing demand being put on them for generating appropriate technologies for enhanced production and sustainability, the Consultation recommended that the CGIAR should not only maintain but further enhance its capacity and institutions building assistance to the NARS.

#### Vision of the NARS on agricultural research

23. The Consultation emphasized that the NARS should also actively participate in the process of readjusting their visions, their policies, strategies and priorities with a clear and coherent sense of future direction, goals translated into a relevant research agenda and worked closely with the various partners at national, regional and international levels not only for sharpening their research agenda but also for receiving much needed attention and support from donors, policy makers and government. The NARS vision should be interfaced with the one proposed for the CG. It recommended that the capacities of the NARS should particularly be strengthened in research policy formulation and priority setting mechanisms.

24. Emphasizing the need for maintaining congruency between increased productivity, sustainability and food security, the Consultation recommended that the NARS should bring a system perspective in agricultural research, technology development and transfer to ensure

judicious and sustainable use of natural resource base leading to increased commodity/system production and factor productivity. In this context, the Consultation recommended that while genetic amelioration will continue to make significant contribution, greater attention must be paid to production management, especially efficient use of resources, such as water, land and agro-chemicals. Interdisciplinary technologies, such as IPM, IPNS, integrated soil and water management, integrated farming system, etc., should receive high priority.

25. Synergism between information base and material technology should be promoted. The necessary changes in the extension and technology transfer services should be brought about to ensure the synergism. The problems and potentials of both well-endowed (irrigated lands) and poorly endowed (drylands) areas should be clearly identified and addressed to. Appropriate technological and policy interventions should be effected. Since rainfed agriculture had received limited attention in the past, the technology development and transfer needs of such areas, which are generally inhabited by resource-poor farmers, should assume high priority.

26. The Consultation underscored that farmer-centred participatory research and farming system approach for technology generation and transfer based on the integration of the ecological prudence and employment intensity of traditional farming system should be emphasized. The role of women in the farming system and appropriate technologies for improving their work efficiency and reducing the drudgery should be augmented.

27. The Consultation recognized that following the GATT agreement, the NARS are under pressure to develop appropriate Intellectual Property Right Systems to take advantage of the liberalized trade environment and recommended that action at national, regional and global levels should be taken to ensure that the regulatory measures facilitate the application of science and technology for national, regional and international public goods. The NARS should give greater attention to related policy issues and strengthen their capacities in policy research.

28. Recognizing that the rate of return on the investment on research and technology has been extremely high, and noting that the support to R&D system both at national and international levels has been declining, the Consultation recommended that the trend should not only be reversed but support to R&D should be significantly augmented to meet the challenges of ensuring accelerated productivity coupled with sustainability.





**Project Title and Number**

Research Reactor Utilisation - RAS/4/011

**Participating Member States**

Bangladesh, China, India, Indonesia, R. O. Korea, Malaysia, Pakistan, Philippines, Thailand, Vietnam.

**Project Technical Officer**

K. M. Akhtar.

**Project Description**

Main goals of this project are to assist institutes in the participating Member States to enhance utilisation of their research reactors and to facilitate mutual collaboration and co-operation. The project was first approved in 1990 as a footnote 'A' project and upgraded on 1 January 1991. The first phase emphasised training of reactor operation personnel and scientists concerned with utilisation. The training programme also included events to improve capabilities for reactor core calculations and measurement of reactor parameters. This has contributed towards optimising reactor performance and better evaluation of safety margins.

The next phase of the project will focus on improving utilisation of neutron beam ports by encouraging and supporting development of Small Angle Neutron Spectrometers through regional collaboration. This was decided in a project formulation meeting held at Taejon, Republic of Korea, in October 1993. The activities for 1995-96 are planned according the decisions of this meeting.

**Major Activities in 1994**

A three week training course on 'Utilisation of Research Reactors' was organised at ANSTO, Lucas Heights, in Australia during 25 April - 13 May 1994. This course overlapped the 9th Pacific Basin Nuclear Conference on 'Nuclear Energy, Science & Technology - Pacific Partnership', 1-6 May 1994 in Sydney, Australia. This interaction with a large international community of scientists was very was really useful.

**Activities Planned for 1995**

1. Pre-project evaluation mission to review the status of neutron radiography programmes in some of the RCA Member States.
2. Regional Workshop on 'Small Angle Neutron Scattering', 17 - 28 April 1995 at Bhabha Research Centre, Bombay, India.
3. Fellowship training and expert assistance to promote SANS programmes.

## P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON RESEARCH REACTOR UTILIZATION
- Place: Australian Nuclear Science and Technology Organisation (ANSTO), Sydney, Australia
- Date: 25 April - 13 May 1994
- Organizers: International Atomic Energy Agency in co-operation with the Government of Australia, through the Australian Nuclear Science and Technology Organisation
- Deadline for nominations: 15 January 1994
- Language: English
- Participation: The workshop is open to 13 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop: The purpose of the workshop is to address the practical difficulties being faced by developing RCA Member States in improving utilization of their research reactors. The focus will be on experimental programmes for beam tube research dealing with neutron scattering studies, neutron radiography, neutron activation analysis. There will be practical demonstrations as well as lectures. In addition to these specific topics there will be some coverage of other applied subjects as well as all common programmes for basic research. This will provide an opportunity to benefit from the experience at ANSTO research establishment and will be an appropriate link to the second phase of the IAEA regional projects on research reactor utilization.
- Participants' qualifications: The candidates should be senior scientists, or reactor users, and involved in neutron beam utilisation.
- Nature of the workshop: The workshop will consist of lectures and demonstration experiments covering neutron scattering, neutron radiography, NAA, production of radioisotopes, and some applied research and development possibilities.

This workshop is being organised to overlap with the 9th Pacific Basin Nuclear Conference on "Nuclear Energy, Science & Technology - Pacific Partnership" scheduled to be held in Sydney 1 - 6 May 1994. The scheme of the Conference and programme topics cover a wide range including research reactors and their utilization. In addition to providing an excellent opportunity for personal contacts among various specialists, the participants will benefit from the technical presentations, discussions and visits arranged for the Conference.

Following topics will be covered during the workshop:

- Basics of neutron scattering
- Basics of small angle neutron scattering
- Experimental facilities
  - filter based instruments
  - mechanical velocity based instruments
  - using conventional, 1d, 2d detectors
- Data acquisition systems
- Advanced experimental facilities
  - using cold sources
  - using cold sources and guides
- Applications - importance related to
  - nuclear solutions, surfactants, polymers
  - ferrofluids, metallurgical systems
  - biological molecules
- Analysis of data, software, science or applications oriented results
- Optimum design/operation of a neutron radiography facilities for low/medium flux reactors
- Neutron radiography imaging techniques and assessment, demonstration
- Status and prospects of neutron radiography applications
- Neutron activation analysis
- Production and applications of radioisotopes.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 January 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone, and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will defray the costs of the participants' air travel from their home countries to Sydney and return, and pay the participants a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.



## CONTRIBUTION TO THE RCA ANNUAL REPORT

## PROJECT: ENERGY AND NUCLEAR POWER PLANNING FOR RCA MEMBER STATES

Based on the successful implementation of the RCA Project on Energy and Nuclear Power Planning (1987-1992), the Project Formulation Meeting (PFM), Jakarta, July 1993, recommended the continuation of the project over the years 1994-1995 and suggested several objectives and related activities. These recommendations were endorsed by the RCA Working Group Meeting (WGM), Bali, February 1994, which accepted the continuation of the RCA project as proposed by the PFM. The WGM also recommended to separate the project objectives into two different RCA projects.

Considering that the new projects would only become operative in 1995, several preparatory activities were organized within the frame of the old project (RAS.0.013). These included the following:

- 1) Expert Advisory Group Meeting on Effective Strategies for Nuclear Power Programme Implementation among RCA Countries, Bangkok, Thailand, 7-11 November 1994.

The meeting was attended to by a total of 16 participants, including one participant each from the following RCA countries: China, Republic of Korea, India, Indonesia, Pakistan, and Thailand. Five additional participants were provided by Thailand at no cost to the project. One expert from France was also sponsored by RCA in order to make special presentations on subjects closely related to the topics of the meeting. The Economic and Social Commission for Asia and Pacific (ESCAP) also sent three representatives, all provided as cost-free experts. The Agency was represented by the Project Technical Officer.

The meeting was very successful in identifying the key issues related to implementation of nuclear power programmes and in outlining the contents of the national reports to be prepared by RCA Member States, which would serve as input to the Regional Workshop on the subject matter to be organized in Republic of Korea, 1995.

- 2) Meeting of National Experts on Data Requirements of IAEA's Planning Models for Energy, Electricity and Nuclear Power with Emphasis on the WASP Model, Jakarta, Indonesia, 12-16 December 1994.

The meeting was attended to by a total of 19 participants, out of which 7 participants were sponsored by the RCA project to represent the following RCA Member States: Bangladesh, Republic of Korea, Indonesia, Malaysia, Pakistan, Philippines and Vietnam, plus one representative from the IAEA. The host country also provided 11 observers at no cost to the project.

All meeting objectives were successfully met. Problems with input information of IAEA's planning models were extensively reviewed, based on the experience of the represented countries, and the main problem areas properly identified. In addition, future activities and actions to be undertaken under the project were defined with the ultimate objective of the organization of a regional workshop on the subject in Manila, October 1995.





## **REPORT OF PROJECT RAS/0/019 NUCLEAR INFORMATION SYSTEM**

- In April 1994 it was held the "Expert Advisory Group Meeting" in India. The following countries participated Australia, Bangladesh, China, Indonesia, India, Japan, Republic of Korea, Malaysia, Mongolia, Sri Lanka, Thailand and Vietnam.

The participant from Australia presented the topic "Information Activities developed at the Australian Nuclear Science and Technology Organization".

The participant from Japan presented the topic "Information Activities developed at the Japan Atomic Energy Research Institute". Both presentations were very useful as they mentioned the information resources of the Centers.

As a result of the meeting the Action Plan for 1994-1995 was prepared. Based on the Action Plan the following activities were developed:

- Document Delivery Service

Some Member States mentioned difficulties to obtain copies of documents needed by their users but not available in the collection of their libraries. To assist them to solve this problem we purchased 5 blocks of BLL (British Library Document Supply Center) and sent for each of the following countries: Bangladesh, Indonesia, Mongolia, Myanmar, Philippines, Sri Lanka and Vietnam. They were requested to keep a record of the use of these coupons and report this at the next meeting of the Project.

- Translations

The access to translations was another problem some countries face. The World Translation Index is available on-line and can be used to identify translations done worldwide. We contacted Australia, Republic of Korea and Japan to know if they have access to this database and in the affirmative case if they would be willing to do searches for the other countries in the Database.

Australia agreed to do that for a trial period. After that an evaluation will be carried out and possible alternatives will be figured out.

- Expert Mission

An expert mission to Malaysia, Indonesia and India took place in October 1994. The expert, Mr. Wesley Taoka prepared a comprehensive report of this mission.

- Questionnaire to Identify the Information Resources of the Information Centers/Libraries

A draft questionnaire was sent to all participating countries for comments.



- **New Project Proposals**

- . Probabilistic Safety Assessment and Industrial Application (Regional Training Course)
- . Noise Analysis Method and its Application Reactor (Regional Training Course)

## **Prospectus (Draft)**

**Title : IAEA Regional (RCA) Training Course on Probabilistic Safety Assessment and Industrial Application**

**Place : Nuclear Training Center, Korea Atomic Energy Research Institute, Taejeon, Republic of Korea**

**Date : 13 October - 3 November, 1995**

**Deadlines for Nominations : 15 July 1995**

**Organizers :**

**The Government of the Republic of Korea, through the Korea Atomic Energy Research Institute (KAERI) in cooperation with the Korea International Cooperation Agency [KOICA] and the International Atomic Energy Agency.**

**Language : English**

**Participation : The course will be open to 20 participants from developing RCA member states in the Region.**

**Purpose of the Course :**

**The purpose of the course is to provide participants in the member states where PSA technology widely use in nuclear power plant and other industries, with the knowledge and the experience of probabilistic safety assessment and application of nuclear power plants and other industries.**

**Participants' Qualifications :**

**Candidates should have a university degree or diploma in an appropriate field, such as engineering or science.**

**Nature of the Course :**

**The training course will consist of lectures, panel discussions, small group workshops and demonstrations. A scientific visit to a nuclear power plant will also be included.**

**Outline of the Course : The following subjects will be covered :**

- General concepts of PSA and risk**
- Use of PSA in NPP design and operation**
- PSA in periodic safety reviews**
- Acceptance criteria for PSA applications**
- Adaptation of standard PSA to configuration control**
- Optimization of safety self assessment**

- Case study
- Application to nuclear waste disposal
- Application to environmental safety
- Site lectures and technical visit
- Others

#### **Application Procedure :**

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training course. Completed forms should be endorsed by and returned through the official channels establishment (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the Office of the United Nations Development Program). They must be received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information; name, age, academic background, present position and full working address (including telex, telephone and facsimile number), to enable the IAEA to make a preliminary evaluation of the candidates.

#### **Language Certificate :**

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country which the language of the course is spoken.

#### **Administrative and financial arrangements :**

Nominating governments will be informed in due course of the name of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The government of the Republic of Korea will out of its contribution to RCA, pay the costs of the participants' air travel from their home countries to Seoul and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is traveling to and from or attending the course, and it is clearly understood that each government, in nominating participants, undertake responsibility for such coverage. Governments should be well advised to take out insurance against these risks.



## **REGIONAL TRAINING COURSE ON NOISE ANALYSIS METHOD AND ITS APPLICATION ON REACTOR**

**(INDONESIA PROPOSAL FOR 1996)**

Regional Cooperative Agreement (RCA) for Asia and the Pacific in Research, Development and Training related to Nuclear Science and Technology is the first Regional Cooperative Agreement under auspices of the IAEA and has been operational since 1972. The objectives is to promote collaboration among RCA member countries in the area of research reactor operation and maintenance, management and optimization of utilization.

Noise from various signals which can be collected by instruments installed in a nuclear reactor supplies a wealth of information, especially on the behaviour of either reactor core or parts internal to the primary circuit. The development of permanent and non-disturbing monitoring system is thus of great interest. However, the complexity of the phenomena and the quantity of the available information itself require a complete physical analysis and sophisticated signal processing to achieve a true surveillance system. Some stages in understanding of phenomena, development of signal processing methods, experimentation on different reactor types have to be reached in order to arrive at real applications on commercial power reactors. Many developments are still necessary, and progress is being made from the aspect of methods as well as of system. Therefore, the world's experts in these techniques is more than ever desirable and a large part of the course is devoted to this.

### **Objective**

To be able to understand the reactor noise phenomena, to use and develop the signals processing methods, and to carry out the noise experiments for evaluation the performance of the system and determination the parameters that are useful for process diagnostics.

**Duration of the course.**

Three (3) weeks

**Lectures**

Three (3) or more senior lecturers (experts in the field) from RCA staff and IAEA experts.

**Participants**

Around 20 persons from RCA countries

**Available Facility**

- Work station
- Personal computers
- Dynamic Signal Analysis (DSA)-2 System including softwares
- Data Acquisition System
- Research reactors

**Course Material.**

**I. Digital Signal Analysis:**

Digital signal processing in time and frequency domain for multivariable signals and multichannels system applied in test and fuel experiments in a reactor environment.

**II. Nuclear Reactor System:**

Survey of different type of reactors, principles, comparisons; reactor dynamics and instrumentation.



**III. Maintenance technology:**

Preventive and predictive maintenance techniques and modern maintenance methodologies.

**Propose time:** middle of 1996.

**Propose lecturers:**

1. IAEA experts: Mr. Turkcan / ECN Petten  
Mr. B.R. Upadhyaya / Univ. of Tennessee-  
USA.
2. RCA staff : From Indonesia, India or Japan

**Course Director : Bakri Arbie, PPSG-BATAN**

**Course Implementor/communicator: Uju Jujuratisbela, PRSG-BATAN**



Project Title & Number: STRENGTHENING OF RADIATION PROTECTION INFRASTRUCTURES  
(RAS/9/006)

Project Description: The project is a cooperative venture between RCA Member States designed to build up radiation protection infrastructures in a part of the world where rapid expansion in the application of nuclear techniques to both medicine and industry is confidently predicted. The project will comprise training courses, workshops and coordinated research programmes. A complete description is provided in the February 1992 Project Formulation Report, reviewed by the Expert Advisory Group Meeting in Melbourne (February 1994) during which priorities were identified.

Participating Member States: Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.

Project Officer: R. Griffith

Major Activities and Achievements in 1994

1. IAEA/RCA Expert Advisory Meeting on Radiation Protection Infrastructures; Melbourne, Australia - 14 to 18 February, 1994
2. Advisory Meeting on Intercomparison of Radioactivity Measurements for Environmental Sampling; Tokai, Japan - February 1994.
3. Expert Training Workshop on Preparation of Offsite Emergency Plans and Countermeasures; Melbourne, Australia - 21 to 25 February, 1994.
4. Consultants Meeting on the Coordinated Research Programme on the Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man - Phase II; Chiba, Japan - 18 to 22 April, 1994.
5. Regional Workshop on External Dose Assessment Techniques; Taiyuan, China - 19 to 26 July, 1994.
6. Regional Training Course on Preparation of Offsite Emergency Plans; Australia - August/September 1994.
7. Regional Workshop on Calibration of Dosimeters and Survey Instruments for Photons; Tokai-mura, Japan, 28 November - 2 December, 1994.

Timetable for Planned Activities in 1995

1. Project Formulation Meeting on the Coordinated Research Programme on the Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man - Phase II; Hitachi-Naka City, Japan - 27 February to 3 March 1995.
2. Expert Advisory Meeting on Radiation Protection Infrastructures; Kuala Lumpur, Malaysia - 20 to 24 March 1995.
3. Consultants Meeting on Regional Intercomparison of Personnel dosimetry for External Monitoring of Photons; Christchurch, New Zealand - 27 to 29 March 1995.
4. Workshop on Notification, Registration, Licensing and Control of Radioactive Sources; Jakarta, Indonesia - 24 to 28 April 1995.
5. Initiation of Regional Intercomparison of Personnel dosimetry for External Monitoring of Photons - July 1995.

6. Expert Advisory Group Meeting to recommend protocols for measurement and dosimetry of radon and thoron; venue to be determined - October 1995.
7. Intercomparison Programme on measurement of radioactivity.
8. Intercalibration study to evaluate the individual capability of laboratories for measurement of radon and thoron.
9. Workshop on regulatory aspects for the named areas of importance (to be confirmed).
10. Participation by RCA countries as observers in a planned emergency exercise (to be confirmed).

**IAEA/RCA EXPERT ADVISORY GROUP MEETING**  
**ON**  
**"RADIATION PROTECTION INFRASTRUCTURES PROJECT" (RAS/9/006)**  
**MELBOURNE, AUSTRALIA, 14-18 FEBRUARY 1994**

**REPORT OF THE MEETING**

The IAEA/RCA Expert Advisory Meeting on Radiation Protection Infrastructures Project RAS/9/006 was held at the Australian Radiation Laboratory (ARL), Melbourne, Australia, 14-18 February, 1994. The Meeting was attended by 17 experts representing IAEA, Australia, China, India, Japan, Republic of Korea, Malaysia and Viet Nam. The full list of participants is given in Annex 1.a.

The purpose of the Meeting was to: review the 1993 RCA Programme in Radiation Protection; discuss and approve the activities for 1994 and the first quarter in 1995; and, to further develop the future programme of RCA activities, as well as the specific requirements for IAEA funding of 1995-1996 activities.

**1. OPENING SESSION**

The Meeting was opened for the IAEA by Dr. P. Strohal. He welcomed all the participants and, on behalf of the Director General Dr. H. Blix, thanked the Government of Australia and particularly the Australian Radiation Laboratory for offering to host this Expert Advisory Group Meeting. He reminded the Meeting that it was normal practice for the host Government to chair the Meetings. Dr. K. Lokan, Director of ARL was nominated for Chairman and was unanimously elected.

Dr. Lokan opened the Meeting by giving a brief review of the responsibilities of the two organisations most concerned with radiation protection in Australia, ARL and ANSTO. He pointed out that ANSTO had a mandate to be involved with the development and exploitation of nuclear technology and that the role of ARL in radiation protection was far wider, also taking in such aspects as non-ionizing radiation.

All participants introduced themselves, giving a brief description of their responsibilities. Following these participant introductions, Dr. Lokan mentioned that the seventh draft of the Australian Radiation Protection Standard (Annex 1.b), based on ICRP-60, was about to be printed and offered to distribute it since it might be of assistance in the implementation of ICRP recommendations in the other Member States. The draft agenda, Annex 1.c, was accepted without amendment.

The Chairman asked whether there were any matters to be considered before proceeding with the next agenda items and there were none.

## **2. REVIEW OF ASPECTS OF RADIATION PROTECTION RELEVANT TO CURRENT AND FUTURE RCA ACTIVITIES.**

### **(a) Overview of RCA Programme in Radiation Protection**

Dr. Easey commented on budgetary and planning considerations for future RCA activities. He mentioned that, until 1991, much of the funding came from extrabudgetary donations from Australia and Japan. IAEA funding has increased significantly since 1991. He pointed out that this is an important time to present the case for IAEA funding of 1995-96 activities. In the expectation of strong competition for resources in the next two year cycle, he stressed the need to present a strong case for Agency funding. The good project framework developed at the 1992 Tokai and 1993 Beijing meetings would form the basis of the case. The need for good documentation of national views and imperatives was emphasised, and any additional supportive materials should be included as part of the country statement reports. He discussed briefly the mechanisms for acceptance and implementation of new projects within the RCA programme. In closing, he commented that most of activities proposed at the 1993 Beijing meeting had been implemented.

### **(b) Overview of IAEA Programme in Radiation Protection and Implications of RCA Activities and Priorities.**

A summary report of regional projects was presented by Dr. Petar Strohál (Annex 2.b.1). The report documented the progress of RCA activities since its inception in 1987. The early RCA activities were related to the Chernobyl accident but a wider range of activities have been developed. He pointed out that the use of nuclear power is increasing in the Asia Pacific region. Several countries including RCA members, such as China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines and Thailand are committed to or seriously considering the use of nuclear power. The effect of the RCA activities in this project were seen to have improved significantly the standard of radiation protection in countries such as Bangladesh, Viet Nam and Sri Lanka. A poor situation was said to still exist in Myanmar (expected to join RCA this year) and Mongolia. It was suggested that special attention should be given to these Member States. He observed that there was a wide range in the levels of safety and regulation throughout the Asia Pacific region. He emphasized the importance of co-operation and harmonization with other organisations, in particular WHO (Annex 2.b.2) to avoid costly duplication.

Dr. Strohal reported that the Agency is preparing a medium-term plan for the period 1995-2000, and foreshadowed changes in the radiation protection projects. The new technical projects are aimed at end users. In particular, projects have to form part of a national programme of development for a recipient country, and activities which are planned and managed professionally will receive the highest priority. He noted that the RCA programme had already been carried out using similar criteria, and the existing RCA practice was in harmony with the new Agency direction.

The long historical delay in the implementation of ICRP recommendations in national legislation was reviewed. It was emphasized that a strong national infrastructure was necessary to achieve the practical implementation of international recommendations.

(c) Overview of National Programmes in Radiation Protection and possible links to Future RCA Activities.

The national programmes of development in radiation protection were reviewed by the delegates from Australia, China, India, Japan, Republic of Korea, Malaysia and Viet Nam (Annex 2.c.1, 2.c.2, 2.c.3, 2.c.4, 2.c.5, 2.c.6, 2.c.7). A number of topics were discussed, including: the existing infrastructure within the Member States and future developments; the implementation of ICRP 60 recommendations; systems of dose limitation; nuclear power production; medical and industrial applications; training programmes; Reference Asian Man; intercomparison projects on dose assessment and monitoring; radiation accidents; internal dosimetry facilities; waste disposal; retrospective dosimetry using electron spin resonance (ESR) and thermoluminescence (TL) in natural materials such as teeth, bone, sugar and building materials; national dose registries; off-site emergency planning<sup>1</sup>; and, programmes for measuring and monitoring environmental radioactivity. During these presentations, mention was again made of the relevance of national programmes to future RCA activities.

### **3. REVIEW OF THE 1993 RCA PROGRAMME IN RADIATION PROTECTION**

(a) Expert Advisory Group Meeting in Beijing, 8-10 March 1993

Dr. Easey reviewed the 1993 Expert Advisory Group Meeting in Beijing (Annex 3.a). He pointed out that this was a very important meeting since it further refined the outputs

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<sup>1</sup> includes actions related to radiation sources as well as nuclear facilities.

from the 1992 Project Formulation Meeting. The outputs and recommendations from the Beijing Meeting gave a very strong structure and definition for the next 4 years of the project. He discussed the major outcomes of the Beijing Meeting such as: the establishment of the main priorities of the programme; a statement of the overall objectives; the setting of quantifiable outputs; a clear definition of the minimum activities required to achieve the desired objectives; and, a series of milestones within the timeframe of the project. He went on to list the highest priority projects established there for the programme. The first of these was Off-Site Emergency, which had three outputs:

- . regulatory control, safe handling, storage and disposal of sealed sources;
- . a national capacity for handling an off-site emergency; and,
- . a regional network to assist in dose assessments.

The second project was External and Internal Dosimetry, which also had three outputs:

- . regionally harmonized dosimetry measurement techniques for ionizing radiation;
- . harmonized measurement techniques for radon and thoron; and,
- . trained specialists in biological dosimetry.

The third priority area was Reference Asian Man. The fourth was concerned with regulations and common implementation of ICRP 60 and the fifth was training in Radiation Protection, with emphasis on development of distance learning materials, particularly for industrial applications. He went on to say that there was strong agreement that future offers of assistance with extrabudgetary activities will need to fall within these established priority areas and added that the aims and objectives for the project are particularly well defined until the end of 1997. In closing he expressed appreciation to the Chinese hosts for a very successful and well-run meeting.

(b) Regional Workshop on "The Application of the ICRP 1990 Recommendations for Radiation Protection" in Kuala Lumpur, 16-27 August 1993

Dr. Ches Mason reviewed the Regional Workshop on "The Application of the ICRP 1990 Recommendations for Radiation Protection" in Kuala Lumpur, 16-27 August 1993 (Annex 3.b). He reported that the workshop was very successful and said that the workshop programme had been informal and flexible, consisting of both lecture and discussion sessions. Some of the items discussed included: external exposure to natural background radiation; action levels for radon exposure; implementation of ICRP 60 into national regulations; and, the



phasing in of the 20 mSv occupational dose limit. He noted that some Member States had not yet obtained copies of ICRP 60 and many participants had not seen them, and commented that provision of copies by the Agency would have assisted the Workshop. There was a general discussion on the provision of documentation and resource materials for training events. Dr. Easey pointed out that resource materials needed to be provided for the participants and for the home institute to ensure that the information was available at a national level. He went on to describe some of the difficulties in providing resource materials and the need for better communication between the Agency Technical Officers and the local Training Course Directors so that sufficient materials can be provided. Dr. Mohd. Yusof Mohd. Ali made an additional comment regarding the need for guidelines on the lecture topics and the extent of coverage of each topic. In conclusion, Dr. Mason pointed out that for this type of flexible workshop, senior and very experienced lecturers were needed so that adaptation of the programme materials could be made at short notice. Moreover these lecturers need ready access to resources, such as computers and printers, to produce lecture materials at short notice.

(c) Regional Workshop on "Radon Monitoring", Hengyang, 11-19 October 1993

Dr. Stephen Solomon (ARL) described the Regional Workshop on "Radon Monitoring", Hengyang, 11-19 October 1993. He commented that Hengyang City is in south central China, which is somewhat remote, but had been chosen as a venue because it has the Research Institute of Uranium Mining with a very strong research group working on uranium mining and radon. He said that the wide range of participant experience and capabilities in radon monitoring presented some difficulties in presenting lectures at a suitable level. The lectures were mainly on monitoring techniques, but also included a lecture on ICRP 60 and ICRP 65 publications. Discussion sessions following the lectures allowed further analysis of particular topics.

Following the first week of lectures, the participants visited a nearby uranium mill and its waste tailings facility and, made measurements of radon in tourist caves. Dr. Solomon was very impressed by the high Chinese standards for radon studies, particularly considering the limited resources available in China. He was particularly impressed by the radon chamber which belonged to the Research Institute of Uranium Mining and was run by the China Nuclear Corporation. He considered it to be well designed, with a high level of accuracy and excellent stability. Dr. Solomon said that the Workshop was very successful and had helped to forge links between the RCA Member State participants. In answer to a question from Dr. Lokan, he stated that written notes on the Workshop were in preparation and that these would be included in the final report (Annex 3.c).

- (d) Expert Advisory Group Meeting on Recommended Protocol for Measurement and Dosimetry for Alpha, Beta, Gamma, X-ray and Neutron Measurement, Hanoi, 6-10 December 1993

Dr. Richard Griffith described the Expert Advisory Group Meeting on Recommended Protocol for Measurement and Dosimetry for Alpha, Beta, Gamma, X-ray and Neutron Measurement, Hanoi, 6-10 December 1993. The report is in Annex 3.d. He pointed out that the thrust of the activities were related to the need for harmonization in radiation measurement and dosimetry procedures. He also mentioned that the participants from China, India and Republic of Korea represented Secondary Standards and Dosimetry Laboratories (SSDL) in their countries. The SSDL system is managed jointly by the IAEA and the WHO. The Meeting dealt with country reports, status reviews of ICRU activities and operational quantities, ISO and IEC activities, written guidance on measurement and dosimetry for radiation protection and protocols and programmes to promote regional harmonization. He also noted that the participants strongly recommended organization of a second RCA personal dosimetry intercomparison. ARL was proposed as a qualified laboratory to provide irradiations for this purpose. He suggested that this might also be a good opportunity to bring the New Zealand Primary Standard Dosimetry Laboratory into the programme. Dr. Lokan said that there would be no problem with ARL assisting with the irradiations and believed that New Zealand would be interested in participating.

- (e) Final Research Coordination Meeting for the Coordinated Research Programme on Reference Asian Man, Tianjin, 25 - 29 October 1993

Dr. Richard Griffith described in detail the outcome of the Final Research Coordination Meeting (RCM) for Reference Asian Man. The report is in Annex 3.e. He pointed out that ICRP dosimetry is based on Caucasian Reference Man and that guidelines for countries in the Asian region may need to be adjusted to the characteristics of their populations. The four major objectives of the CRP were to:

- . obtain adequate country and region specific data on indigenous populations for comparison with ICRP recommendations;
- . identify parameters that are sufficiently different from established recommendations to warrant particular attention in establishing radiation protection programmes;

- develop recommendations, where possible, for use of important, readily measurable anatomical, physical and metabolic characteristics to scale or predict other, more important parameters; and,

- identify Reference Asian Man parameters or characteristics for which sufficient additional information is required that a subsequent CRP or related activity would be necessary.

(f) Workshop on Intercomparison of Radioactive Measurements for Environmental Samples, Tokai, Japan, 21-25 February 1994

Dr. Miyabe previewed the Workshop on Intercomparison of Radioactive Measurements for Environmental Samples, Tokai, Japan, 21-25 February 1994 (Annex 3.f). He described the main objective of the coming Workshop, which was to improve the quality of radioactivity measurements of environmental samples through a programme of intercomparisons using the RCA network. He went on to say that the Workshop will be attended by 13 RCA participants including the recent addition of a participant from Mongolia. Dr. Miyabe outlined the content of the Workshop which will include: a review of the current situation; description of the intercomparison procedures; various measurement techniques including germanium detectors; and measurement geometries. The participants will then arrange for measurements of standard samples to be carried out at various national institutes and they will coordinate the return of the results for the intercomparison. This Meeting recommended that as many national institutes as possible be included as collaborators in the study to maximize the benefits. Each participating country would be represented by one counterpart at the subsequent meetings. The next step of the program will be to hold an Expert Meeting at Tokai in October 1995 where the results of the intercomparison and the need for further activities will be analysed.

(g) Consultants Meeting to Consider Implementation of the Off-Site Emergency Activities Proposed by the IAEA/RCA Expert Group on Radiation Protection Infrastructures, Vienna, 1-5 November 1993

Mr. Peter Burns (ARL) described the Consultant Meeting to Consider Implementation of Off-Site Emergency, Vienna, 1-5 November 1993. The report is in Annex 3.g. He said that the purpose of the Meeting was to consider the formulation of legal requirements for Off-Site Emergencies. The initial problem was to define the difference between "preparing for an emergency" and "responding to an accident". He said that the Meeting had the view

that the greatest problem in many countries was an accident involving industrial or other types of sources, resulting in over-exposure of individuals. These are not ongoing emergency situations, rather it is a matter of responding to that accident. It is necessary to set in place the regulatory framework to prevent such accidents occurring. The recommendations made included: setting up source accountancy, particularly in the area of industrial radiography and brachytherapy; aspects of licensing and registration of users and sources; and, the further extension of regulatory practices as the infrastructure grows. He reported the recommendation that the schedule of activities in the Beijing Meeting report should be carried out in the reverse order namely, expert visits to Member States should precede the Regional Training Course. The findings of the expert visits could form the basis of the instructional materials for the proposed Training Course.

This Consultants Meeting also asked the Agency to consider withholding the provision of large intensity sources to countries which do not have the adequate infrastructure to ensure their safe use.

Dr. Lokan posed the question of the supply of large radiation sources to those countries without the appropriate infrastructure to the Meeting for discussion and it was agreed that the sources should not be allowed to be supplied by the Agency.

(h) Consultant Meeting to plan for a training Workshop on the Preparation of Off-Site Emergency Plans and Countermeasures, Melbourne, 21-25 February 1994

This agenda item was deferred and later incorporated in the address by Dr. Weiss on the Review of Emergency Preparedness in the context of RCA.

(i) Development of Distance Learning Materials

Mr. Michael Pearce presented a review of the present status of the Development of Distance Learning Materials (Annex 3.i). He said that visits to Thailand by Mr. John Grey and Mr. David Woods (ANSTO) showed wide differences in the levels of ability of the end user. Programme changes were then made to develop more appropriate materials. He said that Distance Learning Materials were being prepared in modular form, which ranged from entrance level to high competence levels. The primary areas of interest included industrial uses of radiation and medical applications. He pointed out that the materials can be modified to fine tune the training programme to be in harmony with the needs of the end user. He went on to say that contract delays between IAEA and ANSTO limited the level of

progress resulting in a time slip of 12 to 18 months. He believed that, in the short term, rapid progress could be made which will bring the programme within six months of the formal schedule and essentially put it back on schedule, in the longer term. In closing, he pointed out the primary value of the Distance Learning programme was to: improve the level of radiation safety in the RCA Member States; provide harmony of understanding of safety principles and practice; and, provide a programme which could cover wide ranges of expertise and application at minimum cost.

Some expressions of concern were made from the floor regarding the effectiveness of Distance Learning as a training method in developing countries with meagre infrastructure. Mr. Grey commented that Distance Learning has been used in Australia for many years and has been demonstrated to be a very effective teaching method.

#### **4. FUTURE PROGRAMME OF RCA ACTIVITIES**

##### **4.a Overview**

Dr. Easey reviewed the future work programme and the expected levels of extrabudgetary support. He said that there has been very good implementation of the 1993 programme set out at the Beijing Meeting and that only two activities had not yet been implemented. Neither of the two had budgetary implications. He said that at the end of December 1993 most of the budgetary allocation from the Agency had been expended and outlined the utilization of the extrabudgetary contributions from Australia and Japan. He noted that the majority of the 1994 resources for the project have already been consumed and that this should be an important consideration for anyone considering further requests for assistance this year.

Mr. Grey pointed out that this Meeting was an appropriate forum from which a request for funding of the seminar by the Australian International Development Aid Bureau (AIDAB) could be made. It was important that in any approach to AIDAB, there should be seen to be a strong request from RCA Member States, particularly those classified by AIDAB as being eligible for aid, for this assistance. It was noted that it takes many months of advanced planning and preparation in order to achieve funding.

Concerning the possibilities for China to provide extrabudgetary assistance for the future RCA programme, it was explained that requests for funding would be considered. China currently pays for two Regional RCA Training events each year.

India also funds two Regional RCA Training events each year, and requests for the support of specific training events in this project could be considered within this framework. It was noted that India attached high priority to this radiation protection project.

Japan tabled proposals for RCA activities in 1994 (Annex 4.a.1), 1995 (Annex 4.a.2) and 1996 (Annex 4.a.3). All recieved strong support from the Meeting.

The Republic of Korea may be able to make resources available to assist the project in future years, but some clarification from their Ministry of Science and Technology would be necessary. It was noted that Korea could potentially make a significant input in several aspects of the programme.

Malaysia had already pledged \$50,000 to the RCA programme, specifically for the new UNDP/IAEA/RCA joint project on "The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development". It was possible to use this in activities linked to radiation protection, industrial applications and environmental studies.

Because of its modest resources, Viet Nam was not able to provide large amounts of support for the project but would be prepared to provide facilities for hosting suitable training events or meetings.

#### 4.b Development of Integrated IAEA and Extrabudgetary Future programme

The Output Tables 1, 2 and 3 from the Beijing Meeting report were reviewed with respect to the budgetary requirements and the stated technical needs. The revised tables are given in Annex 4.b.1.

The Meeting agreed that this should be the programme for 1994 and for the period 1995 to 1998.

Dr. Lokan drew the Meeting's attention to the stated intention of the Agency to conduct a Regional Seminar in the Asia and Pacific Region in 1995 (Document 1067 General Conference). The stated purpose is to promote education and training in radiation protection and nuclear safety. He suggested that it would be very appropriate for this Meeting to take the initiative in the design of the Seminar and make appropriate recommendations on content to the Agency.

Dr. Easey said that the scheduling of this Regional Seminar opened up some possibilities for the EAGM to assist in the definition of the seminar content and perhaps in providing more detailed advice and suggestions that could assist in the preparation of the prospectus.

All participants contributed to the discussions on the seminar and there were various headings that were addressed as part of the analysis of what might form the basis for the basic elements. These results have been restructured into a form suitable for inclusion in a prospectus and are shown in Annex 4.b.2.

#### 4.c Project Programme Post 1996

It was agreed that it was rather early to discuss this part of the programme but there had been activities scheduled for 1997 and some for 1998 in the action tables. It was recommended that the following items be reviewed and discussed at the Mid-Term Review in 1995:

- . Thorium aerosol measurement and dosimetry
- . The use of radiation in medical practice
- . Internal dosimetry intercomparison (training exercise by mail)
- . Internal dosimetry intercomparison (circulation of phantoms)

#### 4.d Review of Emergency Preparedness in the context of RCA

Dr. Weiss reviewed the activities of the Off-Site Emergency project. A copy of the overheads used in his presentation are given in Annex 4.d.

### 5. ACTIVITIES FOR 1994

#### 1. Off-Site Emergency

- . Planning Workshops on preparation of off-site emergency plans and countermeasures, Melbourne, 21-25 February 1994 (activity 2.1)
- . Expert Meeting on Intercomparison programme of Radioactivity Measurement for Environmental Samples, Tokai, 21-25 February 1994 (activity 2.4)

- . Regional Workshop on preparation of Off-Site Emergency Plans, Mount Macedon and Sydney, 28 August - 9 September 1994 (activity 2.5)
- . Development of a regional network of national contacts for assistance in emergency situations (activity 3.1)
- . Compilation of inventory of national capabilities in RCA Member States for assistance in emergency situations (activity 3.2)

2. Dosimetry (External and Internal)

- . Commencement of second RCA Personal Dosimeter Intercomparison (activity 1.2)
- . Regional Workshop on Calibration Techniques for External Photon Radiations, Tokai, 28 November - 2 December 1994 (activity 1.5)
- . Regional Workshop on External Dose Assessment Techniques, Taiyuan, date to be arranged (activity 1.6)

3. Reference Asia Man

- . Consultants Meeting for review and planning, Chiba, 18 - 22 April 1994
- . Project Formulation Meeting for second phase of CRP (place and date to be arranged)

4. Regulations

- . Development of national networks for all relevant Agencies involved in radiation protection and major practices affected by the ICRP 60 recommendations (activity 1.2)

5. Training in Radiation Protection

- . Production of trial materials for distance learning (activity 1.2)



## **6. CONCLUSIONS AND RECOMMENDATIONS**

The Meeting reviewed the 1993 activities and were pleased with the high degree of implementation and the outcome from the various activities. Recent developments such as radiological accidents in China and Viet Nam had only served to illustrate that the design of the programme was directly in line with the regional needs.

There was strong support coming from the RCA Member States and there was a strong expectation of increasing extrabudgetary support from them over the term of the project (1992 to 1997). The framework of activities set down in the Tables 1 to 5 (Annex 4.b.1) were the minimum necessary to achieve the stated outputs and it would be advantageous to supplement them if at all possible.

The Meeting recommended that the action plan for the project be amended to take into account the revised project needs as discussed and agreed at this Meeting. The new action plan is outlined in the Tables in Annex 4.b.1 and this is recommended to be that new action plan. The Meeting further recommended that:

- . the IAEA provide at least the levels of funding indicated in the tables for the years 1995 and 1996;
- . the Member States that have activities in the tables notionally marked for extrabudgetary support, sympathetically consider making funds available;
- . all RCA States review the programme for 1994 to 1998 and consider whether they can make extrabudgetary support available for any of the project activities;
- . any Member State wishing to host any event in the programme 1994 to 1998 should make an offer to the RCA Office;
- . the IAEA is requested to take into consideration the stated priorities, aims and objectives of the RCA project when considering the design and development of the programmes for radiation protection in the Asia and Pacific Region; and,
- . the IAEA is requested to consider the proposal made in respect of the proposed Regional Training Seminar for Asia and Pacific in 1995 on the

promotion of education and training in radiation protection and nuclear safety as outlined in Annex 4.b.2.

## ACTIONS

### Meeting Participants

Those participants that have activities in the tables marked for extrabudgetary assistance from their country, should approach their relevant authorities to attempt to secure agreement on obtaining funds. They should report back to the RCA Office on the results of these inquiries. Specifically:

In 1994, it is requested that:

- . Japan makes funds available to support their participation in the Expert Advisory Group Meeting scheduled for the period covered by their 1994 special contribution to RCA; and,
- . Malaysia consider hosting the next Expert Advisory Group Meeting, possibly in association with the RCA Working Group Meeting.

In 1995 it is requested that:

- . the Republic of Korea makes funds available to enable observers to attend planned exercises on Off-Site Emergency;
- . Japan makes funds available for a meeting of those involved in the Intercomparison Programme on Measurement of Radioactivity;
- . Australia and Japan, through ARL and JAERI and PNC respectively support the Intercomparison Study for Dosimeters; and,
- . Japan makes funds available to support a mid-term review of the project for all participating Member States in an RCA Member Country from its special contribution to RCA for 1995.

In 1996 it is requested that:

- . Japan makes funds available for a Regional Workshop on Contamination Monitoring;
- . Australia makes funds available for a Regional Expert Meeting to review the implementation of ICRP 60 recommendations; and,
- . India makes funds available for a Regional Training Course on the Implementation of ICRP 60 recommendations.

In 1997, it is requested that:

- . India makes funds available for a Workshop to consider the results of the RCA personal dosimetry intercomparison;
- . Australia makes funds available for a Regional Training Course on biological dosimetry;
- . Japan and/or Republic of Korea make funds available for a Regional Workshop on Off-Site emergency preparedness;
- . Japan makes funds available for a Regional Training Course on recent developments in basic radiation protection;
- . the IAEA, as a part of its regular regional programme, makes funds available for a Training Workshop on dose assessment arising from a radiological accident; and,
- . Japan makes funds available for a meeting of those participating in the Intercomparison Programme on measurement of radioactivity, if this activity is not completed in 1995.

In 1998, it is requested that:

- . China makes funds available for a Meeting for those involved in the Intercomparison Programme for radon and thoron measurement and dosimetry.

All RCA National Co-ordinators should identify:

- . all relevant national agencies involved in radiation protection and major practices affected by ICRP 60 recommendations;
- . those counterparts at a national level able to coordinate and contribute to the provision of national emergency assistance;
- . activities that they wish to host and inform the RCA Office well in advance;
- . suitably experienced and qualified individuals who could undertake expert assignments or lecturing duties for the current RCA programme of activities.

Project Technical Officer should identify:

- . suitable technical officers for the sub-projects.

RCA Co-ordinator should:

- . copy, for information, all announcements of Regional RCA training events to the National Coordinators.

## **7. CLOSING SESSION**

The Meeting welcomed Dr. Griffith as the new Technical Officer for the overall project. He has already participated as a Project Officer for the Reference Asian Man and Dosimetry components.

The Meeting expressed its appreciation of the efforts of Dr. Strohal in his role of Technical Officer for the project for the past seven years. His enthusiasm and energy had been a significant factor in sustaining the high level of motivation of the National Coordinators which had combined with the well-planned and well-designed programme to produce the high levels of achievement observed.

The Meeting expressed its gratitude to ARL for hosting the Meeting and were most appreciative of the hard work and dedication of the ARL staff in enabling the very full schedule to be achieved and the draft report to be prepared on the final day. All participants wished to record their thanks for the kindness and consideration shown by ARL staff during their stay and acknowledged the generous additional support provided by ANSTO.

# P r o s p e c t u s

- Title:** REGIONAL (RCA) WORKSHOP ON EXTERNAL DOSE ASSESSMENT TECHNIQUES
- Place:** Training Center of Radiation Protection and Nuclear Safety (TCRPNS), China Institute for Radiation Protection (CIRP), Taiyuan, Shanxi Province, China
- Date:** 19 - 26 July 1994
- Deadline for nominations:** 15 April 1994
- Organizers:** Government of China through the Training Center of Radiation Protection and Nuclear Safety, China Institute for Radiation Protection, in co-operation with the International Atomic Energy Agency
- Language:** The language of instruction will be English.
- Participation:** The workshop is open to 13 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop:** The purpose of the workshop is to:
- provide the participants with an opportunity to exchange information and experience regarding implementation and conduct of external dosimetry programmes in their countries;
  - present and review the International Commission on Radiation Units and Measurements (ICRU) operational quantities for personal monitoring;
  - provide an overview of the principles for calibration of dosimeters and instruments;
  - introduce recent dose assessment concepts and techniques.
- Participants' qualifications:** Candidates should be:
- scientific and technical personnel from the region who are already engaged in relevant work on evaluation methods of external dose;
  - representatives of regulatory organizations or other specialists responsible for organization and management of personal monitoring services and programmes.
- Candidates must have a good command of English.
- Scope and outline of the workshop:** The workshop will concentrate on participants' presentations and discussions of the following topics:
1. External dose monitoring methods
  2. Collection, interpretation and management of external dose data
  3. Assessment of external dose
  4. Calibration of personal dosimeters and instruments
  5. Impact of recent ICRP and ICRU recommendations on external dose monitoring and assessment.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 April 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of China will, out of its contribution to RCA, pay the costs of the participants' air travel from their home countries to China and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

# P r o s p e c t u s

Title: REGIONAL WORKSHOP ON OFF-SITE PLANNING AND COUNTERMEASURES  
FOR RADIOLOGICAL EMERGENCIES

Place: Emergency Management Australia, Mount Macedon; and  
Australian Nuclear Science and Technology Organisation,  
Sydney, Australia

Date: 12 - 23 September 1994

Deadline for  
nominations: 31 May 1994

Organizers: International Atomic Energy Agency in co-operation with the  
Government of Australia through the Australian Nuclear  
Science and Technology Organisation, the Australian  
Radiation Laboratory, and Emergency Management Australia

Language: The language of instruction will be English.

Participation: The workshop is open to 25 participants from developing  
Member States in the Asia and Pacific region.

Purpose of the  
workshop: The purpose of the workshop is to provide the participants  
with the understanding of the principles of developing a  
national radiological accident/emergency plan and to carry  
out the steps necessary to implement such a plan.

The participants will be provided with the knowledge and  
skills to upgrade the basic capability to:

- Respond to;
- Measure the impact from;
- Assess the effects of;
- Mitigate the consequences of; and
- Recover from;

a radiological accident/emergency and to document this  
appropriately.

Participants'  
qualifications: Candidates should be mid to senior-level officials from  
organizations who would have a substantial role in a  
response to a radiological incident or accident, and have  
a good technical background and experience from  
organizations which have the following responsibilities:

- Provision of technical advice on radiation  
accident/emergency planning to national or regional  
decision makers;
- Provision of radiation protection technical support;
- Coordination of overall national accident/emergency  
planning.

Candidates must have a good command of English.



Scope of the  
workshop:

The workshop should be focused on upgrading the national capability to plan for, implement and respond to a radiological accident/emergency. The emphasis will be on radiological accidents with the potential for exposure to the general public, including reactor accidents, Goiana-type accidents, industrial radiography accidents, satellite re-entry, etc. Although there will be considerable discussion of the experience related to planning for nuclear power plant accidents, the relationship of this background to other activities, e.g., sealed sources and research reactors, will be stressed.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 May 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Australia and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

## P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON CALIBRATION OF DOSIMETERS AND SURVEY INSTRUMENTS FOR PHOTONS
- Place: Japan Atomic Energy Research Institute, Tokai, Japan
- Date: 28 November - 2 December 1994
- Deadline for nominations: 31 July 1994
- Organizers: Government of Japan through the Japan Atomic Energy Research Institute; and the Power Reactor and Nuclear Fuel Development Corporation, in co-operation with the International Atomic Energy Agency
- Language: The language of instruction will be English.
- Participation: The workshop is open to 14 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop: The workshop is to familiarize engineers and scientists who are responsible for calibration of radiation protection equipment with internationally recommended techniques for calibration of dosimeters and survey instruments. Emphasis will be given to calibration in terms of the ICRU operational quantities used for personal and area monitoring in occupational protection. Presentations will stress practical demonstration and discussion. The workshop will also introduce participation in the 2nd IAEA/RCA personal dosimetry intercomparison programme planned to begin in 1995.
- Participants' qualifications: Candidates should be engineers and/or scientists who are responsible for calibration of dosimeter and instruments in their respective institutions. They should have responsibility for, and be directly involved in, calibration of radiation protection instruments.
- Each participant will be expected to present a report on the status of radiation protection calibration activities in his/her country, including the type of radiation producing facilities for which they provide instrumentation; number, type and manufacturer of instruments in their inventory; the calibration facilities available to them; and specific problems they may have experiences related to calibration, including application of ICRU operational quantities.
- Candidates must have a good command of English.
- Outline of the workshop: The workshop will consist of:
- Lectures and discussion:
- Overview of the ICRU operational quantities used to demonstrate compliance with ICRP recommendations.
  - Calibration of photon reference fields.

- Use of conversion coefficients to determine the ICRP limiting quantity, Effective Dose, and the ICRP operational quantities, Amber Dose Equivalent and Personal Dose Equivalent.
- Measurement and calibration of instruments in terms of the ICRU operational quantities.
- Review of previous regional and interregional photon dosimetry intercomparison programmes.
- Postal reference dose intercomparisons of calibration fields using phosphate glass dosimeters.
- The 2nd IAEA/RCA personal dosimetry intercomparison to begin in 1995.

Participant's presentations:

- Individual country reports on the status of radiation calibrations for radiation protection purposes, including application of the ICRU operational quantities.

Practical exercises:

- Calibration of survey instruments and dosimeters for external photon radiation in terms of the ICRU operational quantities

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 July 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of Japan will, out of its special contribution to RCA, pay the costs of the participants' air travel from their home countries to Japan and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

Project title and number: RAS/9/006 Strengthening of Radiation Protection Infrastructures - Intercomparison of Radioactivity Measurement

Project Description: Radioactivity measurement for environmental samples is one of the important items in effective evaluation for radiation protection. The technique of the measurement is structured with many components, such as chemical separation and measurement of radioactivity, calibration of instruments, evaluation and assessment of results among others.

The programme is designed to help RCA Member States to exchange the information on radioactivity measurements for environmental samples and to improve the accuracy and comparability of the measurements.

Participating Member States:

Bangladesh, China India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

Project Officer: J. La Rosa

Major Achievements and Activities in 1994:

As the first step of the programme the IAEA/RCA Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples took place in PNC, Tokai, Japan from 21-25 February 1994 as an activity of the RCA project on "Strengthening of Radiation Protection Infrastructure".

The Meeting was open to participants from RCA member states in the East Asia and Pacific Region and 11 participants attended the meeting (only 3 Member States did not send a participant). Every participant presented a 30 minute paper as a "Country Report ". The paper included the present situation of environmental radioactivity measurement in his/her country or organization. Special lectures on radioactivity measurement were also given along with a technical exercise on calibration for Ge/Ge(Li) system, dilution of the sample and activity measurement. The Japanese Coordinator had also organized a technical tour of Japan Chemical Analysis Center for the meeting participants.

The Expert Meeting contributed to establishing the comparability of the radioactivity measurement results of environmental samples within the RCA region through the practical intercomparison procedure prepared by PNC and JAERI. The first intercomparison exercise with liquid Cs-137 solutions prepared by PNC/JAERI commended with the sending of those samples from the IAEA's Seibersdorf Laboratories to all participants at the end of August 1994.

Planned Activities for 1995:

1. The measurements of the liquid (first) intercomparison exercise are evaluated at PNC. The results are transmitted to the RCA participants and discussed with them.
2. The second (spiked air filter) and third (solid: soil or ash) intercomparison exercise samples are prepared and distributed to the RCA participants. The measurements of the second intercomparison exercise are tentatively reported to PNC in time to be evaluated and discussed at the second IAEA/RCA Expert Meeting (see item 3 below).
3. The Second IAEA/RCA Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples is planned for October 1995 in PNC, Tokai, Japan. All participating RCA Member States are expected to send representatives who are actively engaged in environmental radionuclide measurements with gamma spectrometry systems. The results of the first and second intercomparison exercises are to be discussed with the aim of improving accuracy and harmonization of methods.

J. La Rosa  
1994-01-29



**PROJECT TITLE AND NUMBER:** REFERENCE ASIAN MAN CRP (PHASE 2):  
INGESTION AND BODY CONTENT OF TRACE ELEMENTS OF IMPORTANCE IN  
RADIOLOGICAL PROTECTION (number not known)

**Project Description:** At the final Research Co-ordination Meeting for the earlier CRP on Anatomical, Physiological and Metabolic Characteristics of Reference Asian Man (Tianjin, China, October 1993), it was recommended that a second phase of the work should be initiated with the aim of obtaining data on the ingestion and body content of trace elements of importance in radiological protection. Based on the results of a Consultants' Meeting held in Japan in April 1994 it is further proposed that the new CRP will be concerned with some or all of the following trace elements: caesium, iodine, strontium, thorium and uranium. The samples of primary interest will include some or all of the following: nationally representative specimens of (1) total diets and individual staple foodstuffs, and (2) autopsy specimens of liver, muscle, thyroid and bone. The analyses will be done by nuclear and nuclear-related analytical techniques (i.e. NAA, PIXE, XRF and/or ICP-MS) together with other complementary techniques (e.g. AAS) according to the facilities available in the participating Member States. This CRP is expected to be supported financially by the Japanese Government.

**Participating Member States:** At present none (but potentially open to all RCA Member States starting in 1995)

**Project Officers:** R.M. Parr and R.V. Griffith

**Major Achievements and Activities in 1994**

1. A Consultants' Meeting, held in Japan in April 1994, recommended the setting up of this CRP and prepared a draft outline of its intended purpose and scope.
2. Informal pre-proposals to join the new CRP were received from nine RCA Member States.

**Planned Activities for 1995**

1. A Project Formulation Meeting will be held in Japan from 27 February to 3 March 1995.
2. Subject to the approval of the next General Conference Meeting of RCA Member States, the new CRP is expected to be initiated in the fourth quarter of 1995.





- **New Project Proposal**

Storage and Planning for Disposal of Radioactive Waste



## PROPOSAL FOR RCA PROJECT ON

### STORAGE AND PLANNING FOR DISPOSAL OF RADIOACTIVE WASTE

#### BACKGROUND

Most of the present Regional Co-operative Agreement (RCA) Member States have waste management activities to ensure the safe utilization of radioisotopes in industries, hospitals and research institutions as well as operation of nuclear power plants. The level of waste management differs from each Member State ranging from the handling of materials containing spent radioisotope sources to the whole spectrum of activities including processing, storage and disposal of LILW, HLW (including Spent Fuel) and mining/milling waste as well as decontamination and decommissioning (App. 1).

Among those activities, disposal needs a long lead time and its technical concept should be in place as early as possible to provide technical guidelines to pre-disposal activities. Waste acceptance criteria for a repository will provide guidance on waste conditioning and packaging. Member States without disposal repositories need an interim storage prior to final disposal. Storage should be in accordance with a disposal concept which may exist or be planned.

Disposal activities comprise not only planning, siting, design, construction, operation, closure and institutional control (if required) but also performance assessment, formulation of waste acceptance criteria, quality assurance and public information. Identification of inventories for each type of radioactive waste concerned is a prerequisite for implementing the disposal activities. The planning of disposal, which should take into account the interdependencies among the aforementioned activities as well as pre-disposal activities, need to be implemented as soon as possible by those Member States having on-going waste management programmes. In this respect, storage and planning for disposal are considered to be common issues in the RCA member countries at the moment.

Meanwhile, very limited activities on waste management have been implemented under the RCA programme. The inter-regional model project on waste management is focusing only on waste management infrastructure to provide a sound basis for management. Other IAEA Technical Co-operations at national level have also dealt with some specific concerns of individual Member States on storage and disposal for LILW (App. 2). However, there is a lack of forum in which the RCA Member States can exchange views, share information and develop a common approach to the same goal as well as national programmes regarding storage and disposal, in a systematic and integrated manner. It is felt that the time is ripe to consider in depth waste management within the RCA programme beginning with the storage and planning for disposal. The attached appendices and WAMAP and WATRP Mission reports support this fact.

Regional co-operation on the issues could be beneficial for those countries in terms of transboundary safety, technology transfer and problem solving of common concern. The transboundary safety requires such activities of one country to limit the potential risk of neighboring countries within the acceptable level of safety. Principles, standards and

guides which will soon be completed under the RADWASS programme could be the basis for approaching the issues in their countries. Within the region, countries are facing difficulties in implementing storage and disposal activities due to regulatory resource limitations and technical expertise limitations. However, some countries have adequate technologies and facilities, especially for LILW which can facilitate the transfer of technologies thereby reducing financial burden for the neighboring countries since they would not have to develop the technologies concerned. In the case of HLW, cooperative feasibility studies relying on experiences gained from available underground laboratories and performance assessments would also be mutually beneficial. Also, regional long term storage for long lived spent radiation sources (SRS) and possible regional disposal concept may be worthy of being considered in this region. Moreover, the preparedness of those Member States for regional co-operation could help and facilitate effective technology transfer and problem solving of common technical issues.

Target countries and their expected benefits from this proposed project are summarized in App.2.

## OBJECTIVE

To review and/or establish technical guidelines for the safe storage of radioactive wastes and comprehensive plans for final disposal of wastes, based on inventories identification and waste systems in place. Build up relevant capabilities for implementing those activities concerned using common approaches suitable within the RCA Member States region.

## ANTICIPATED POSSIBLE OUTPUT

- Technical guidelines for storage applicable to individual Member States involved;
- Disposal plans depending on waste types and situations in individual Member States involved;
- Trained Staff members in each participating Member States regarding storage and disposal;
- Mutual understanding of the waste management approaches.

## WORK SCOPE COULD INCLUDE

Meeting of National Co-ordinators:

- initial project programme review
- mid-term project review
- final project review

#### Workshop:

- preliminary workshop to identify waste inventories, to discuss waste management status of Member States and waste disposal strategy in the region as well as to review planning issues regarding disposal and technical guidelines for storage (safety criteria, siting, design, performance assessment and licensing, operation, closure/decommissioning and/or institutional controls);
- second workshop to summarize the technical guidelines and plans for disposal, which are established within this programme, to exchange information gained through planing and/or implementing related activities, and to foresee future waste management directions.

#### Training Course:

- Safety principles and technical guidelines for storage and disposal, and alternative strategies of waste management;
- Site characterization and design for storage and disposal facilities;
- Preliminary performance assessment, licensing and quality assurance for storage and disposal

#### IMPLEMENTATION PLAN

A project formulation meeting is desirable to be held in 1995 in order to identify the expected output and work scope, and establish the implementation plan in accordance with the specific needs of Member States involved.

# Appendix 1. STATUS OF WASTE MANAGEMENT IN RCA MEMBER STATES

(Prepared based on "Radioactive Waste Management Profile (TECDOC-629) )

Country	Nuclear Activity				Waste Management				
	NPP	RR	RA	MM	SRS	TRE	STO	DIS	MM
Australia		O	O	O	O	O	O	(O)	O
Bangladesh*		O	O		O	O	O		
China	O	O	O	O	O	O	O	(O)	O
India	O	O	O	O	O	O	O	O	O
Indonesia	<O>	O	O		O	O	O	(O)	
Japan	O	O	O		O	O	O	O	
Republic of Korea	O	O	O		O	O	O	(O)	
Malaysia		O	O	O	O	O	O	<O>	O
Mongolia*			O		O				
Myanmar*			O		O				
New Zealand			O		O				
Pakistan	O	O	O		O	O	O	O	
Philippines		O	O		O	O	O		
Singapore			O		O				
Sri Lanka*			O		O				
Thailand*		O	O		O	O	O		
Viet Nam*		O	O	O	O	O	O		
NPP	Nuclear Power Plant				O	facility in operation			
RR	Research Reactor				(O)	project for construction			
RA	Radioisotope Application					under process			
SRS	Spent Radioisotope Source				<O>	facility planned			
TRE	Treatment/Conditioning					* information not available			
STO	Storage					from "Radioactive Waste			
DIS	Disposal					Management Profiles"			
MM	Mining and Milling								

## Appendix 2 TARGET COUNTRIES AND THEIR BENEFITS FROM THE PROPOSED PROJECT

(TC status is based on TC Full Project Status Report for projects active in Asia since 1980)

Australia	TC : none	
	Assistance to Member States on	S/LILW, S/SRS, S/HLW P/LILW, P/SRS, P/MM
	Benefits from the proposed project on	P/HLW, P/MM
Bangladesh*	BGD/9/005 (84-89) Handling, treatment, storage and disposal (safety evaluation, sorption study) of RW from research reactor and radioisotope production facilities. BGD/9/007 (91- ) handling, treatment, conditioning and storage and site selection of LILW	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/HLW P/LILW, P/HLW, P/SRS
China	CPR/9/007 (87-94) Polymer solidification for organic waste CPR/9/014 (91-94) Capability enhancement of site selection and of safety analysis for LILW disposal system	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/SRS, S/HLW P/LILW, P/SRS, P/HLW, P/MM
India	TC : none	
	Assistance to Member States on	S/LILW, S/HLW P/LILW
	Benefits from the proposed project on	P/SRS, P/HLW, P/MM
Indonesia	INS/9/006 (84-90) Improvement of disposal system at Banan Research Centres (Pre-disposal area was focused) INS/9/010 (86-90) Establishment of siting criteria safety analysis methodology for underground disposal INS/9/017 (91-94) Strengthening capability of decontamination of nuclear facilities	
	Assistance to Member States on	-

	Benefits from the proposed project on	S/SRS, S/HLW P/LILW, P/SRS, P/HLW
Japan	TC : none	
	Assistance to Member States on	S/LILW, S/SRS, S/HLW P/LILW, P/SRS, P/HLW
	Benefits from the proposed project on	P/LLW, P/SRS, P/HLW
Republic of Korea	ROK/7/002 (93- ) Marine environmental radioactivity monitoring ROK/9/011 (78-82) Manufacture of air cleaning system in NPP ROK/9/012 (78-79) Immobilization of liquid waste ROK/9/021 (82-92) Treatment and disposal of LILW ROK/9/022 (Establishment of RW programme including criteria for LILW disposal	
	Assistance to Member States on	S/LILW, S/HLW P/LILW
	Benefits from the proposed project on	P/LILW, P/SRS, P/HLW
Malaysia	MAL/7/004 (93- ) Marine contaminants and sediment transport MAL/9/010 (91- ) Development of waste immobilization techniques and study on the long term storage and disposal of immobilized waste	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/LILW, S/SRS, S/HLW P/LILW, P/SRS, P/HLW
Mongolia*	TC : none	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/SRS, S/LLW P/LLW, P/SRS
Myanmar*	TC : none	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/SRS, S/LLW P/LLW, P/SRS
New Zealand	TC : none	
	Assistance to Member States on	-



Pakistan	Benefits from the proposed project on	S/SRS, S/LLW P/LLW, P/SRS
	TC : none	
	Assistance to Member States on	S/LILW, S/SRS, S/HLW P/LILW
Philippines	Benefits from the proposed project on	S/SRS, S/HLW P/LILW, P/SRS, P/HLW
	PHI/9/009 (79-80) Establishment and implementation of a national waste management system (one fellowship)	
	PHI/9/016 (85- )Establishment of a waste conditioning facility, management of spent sealed sources	
	PHI/9/018 (91- ) Upgrade LLW treatment, conditioning and storage system	
	Assistance to Member States on	-
Singapore	Benefits from the proposed project on	S/SRS, S/HLW P/LILW, P/SRS, P/HLW
	TC : none	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/LLW, S/SRS P/LLW, P/SRS
Sri Lanka*	TC : none	
	Assistance to Member States on	-
	Benefits from the proposed project on	S/LLW, S/SRS P/LLW, P/SRS
Thailand*	THA/4/012 (91-93) waste processing and storage for a nuclear research institute	
	THA/9/009 (83-89) Incineration and underground disposal	
	THI/9/013 (88-91) Off gas cleaning and re-generation of spent ion exchange resins	
	THA/9/015 (91- ) Design of a waste processing and storage facility (Disposal was intended but not covered)	
	Assistance to Member States on	
	Benefits from the proposed project on	S/LILW, S/SRS, S/HLW P/LILW, P/SRS, P/HLW

Viet Nam\* TC : none

Assistance to Member States on -

Benefits from the proposed project on S/LILW, S/SRS, S/HLW  
P/LILW, P/SRS, P/HLW, P/MM

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S/LILW Storage technology on LILW

S/SRS Storage technology on SRS

S/HLW Storage technology on HLW

P/LILW Disposal planning for LILW

P/SRS Disposal planning for SRS

P/HLW Disposal planning for HLW

P/MM Disposal planning for Mining and Milling Waste

- **Report on the 1994 activities of the Joint Project UNDP/RCA/IAEA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development (RAS/92/073)**

Extract from the Report of National Co-ordinators Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Lucas Heights, 28-29 April 1994.

Extract from the Report of the Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Sydney, 3 May 1994.

Extract from the Report of the Tripartite Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Vienna, 24 September 1994.

Fax to Mr. Willi Scholl on "Implementation of Recommendations from Tripartite Review Meeting", RAS/92/073, 23 November 1994.

Fax from Mr. S. Zacharia on UNDP budget cuts, 30 November 1994.

Fax to RCA Co-ordinators:

- technician training
- promotion and awareness
- changes to programme

Extract from the Mid-Term Review Mission for the joint project carried out 26 February to 17 March 1995.

Notes on the Mid-Term Review (RAS/92/073).

Extracts from the National Co-ordinators Meeting on:

- Radiation Technology;
- Nucleonic Control Systems and Tracer Technology; and
- Nuclear Analytical Techniques.

Technical Officers' Report for Radiation Technology

Technical Officers' Report for Tracer Technology in Industry

Technical Officers' Report for Nuclear Analytical Techniques

Technical Officers' Report for Non-Destructive Testing

"Keeping Pace with Change in the Regional Co-operative Agreement (RCA) for Asia and the Pacific" paper presented to UNDP RDC.

"Notes on RCA Experience of ICP-5" Paper presented to UNDP RDC.

Professor Pham Duy Hien's report.

- **Extract from the Report of National Co-ordinators Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Lucas Heights, 28-29 April 1994.**



**NATIONAL COUNTERPARTS MEETING**  
**FOR**  
**THE JOINT UNDP/RCA/IAEA PROJECT FOR ASIA AND THE PACIFIC**  
**ON**  
**"THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN**  
**TECHNOLOGY AND SUPPORT ENVIRONMENTALLY**  
**SUSTAINABLE DEVELOPMENT"**  
**RAS/92/073**  
**ANSTO, Lucas Heights, Australia**  
**28 - 29 April 1994.**

The National Counterparts Meeting was held at the Australian Nuclear Science and Technology Organization's (ANSTO), Lucas Heights Research Laboratories, Sydney, Australia from 28 to 29 April 1994. It was attended by 16 participants from 14 RCA Member States, only Japan did not send a representative. The list of those attending is given in Annex 1.

**1. SESSION 1: OPENING**

**1.1 Welcome on behalf of the Government of Australia.**

Dr. Adam Jostsons, Director of the Advanced Materials Programme at ANSTO opened the meeting with welcoming remarks on behalf of the Government of Australia and ANSTO, in which he reviewed the Australian contribution to the joint project, noted the direct contribution that Member States were making to RCA funding and emphasized the beneficial nature of the RCA activities to regional co-operation. He commented that one task for the National Counterparts was to ensure that the project activities were relevant to Member States' needs and that the real benefits of the project were evaluated. In concluding Dr. Jostsons expressed the hope that the delegates would be able to have a fruitful meeting and have time to visit some of the ANSTO facilities as well as getting broader experiences of Sydney and its surrounding area. A full text of his remarks are given in Annex 2.

**1.2 Opening Remarks by RCA Co-ordinator**

Dr. John F. Easey, RCA Co-ordinator, thanked the Government of Australia and ANSTO for agreeing to host the Meeting. He also thanked the ANSTO secretariat for all their efforts in the organizational aspects of setting up the Meeting and assisting the delegates. He welcomed all the delegates to this first Meeting of UNDP National Counterparts and was pleased to note almost all Member States were represented. Only Japan had not been able to attend.

He outlined the problems that had been encountered because of the late approval of the Project Document by UNDP in April 1993 and the consequent effects on project implementation. He noted that, inspite of this, five Regional training events had been carried out in 1993, starting with the Regional Training Course (RTC) on the "Application of Modern Isotope and Radiation Techniques to Industry" held in Sydney in May 1993 and followed by two RTC's on Radiation Technology held in Japan in May and September/October 1993, a RTC on Industrial Application of NDT and Evaluation held in the Republic of Korea in October 1993 and a Regional Workshop on the "Economic Benefits of Radiation Processing" held in China in October 1993.

He noted with pleasure that the Chief Technical Officer, Professor Pham Duy Hien had been appointed in mid February 1994 and he had taken up his duties stationed in the Project Office at CAIR-BATAN, Jakarta. He informed the Meeting that the appointments for the two planned long-term expert positions had been delayed because of administrative hold-ups but were now expected to be made shortly.

The RCA Co-ordinator briefly reviewed the purpose of the present National Counterparts Meeting and detailed its relationship with the Tripartite Review Meeting (TPRM) on Tuesday 3 May. He noted that UNDP New York had not yet provided any information on who would be their representative for the TPRM. The full text of the remarks is given in Annex 3.

### 1.3 Comments by Chief Technical Officer.

Professor Pham Duy Hien, Chief Technical Officer for the joint project, made a presentation to delegates on aspects of the project. He expressed his pleasure at being at the Meeting in his capacity as Chief Technical Officer, an assignment that he had taken up 2 months earlier. He noted the strong support that Australia and ANSTO had provided for the RCA and the joint project in particular. He stressed the importance of being able to monitor the project progress and impact. He suggested that the technology transfer process needed to be assessed on the basis of the quantity, quality and level of technology adaptation. He noted the need for assessment of the quality of training achieved in regional events through the use of examinations.



He reviewed the commercialization of nuclear techniques and the associated problems and illustrated the remarks using radiation vulcanization of natural rubber latex, RVNRL as an example.

He noted the need for efforts on public acceptance of nuclear technology and the need to have trained scientists and technologists available locally to assist in this process. He illustrated this using the example of the NDT project component and the need for quality and quantity in such training. He again referred to the role of training courses in this aspect. A full text of his comments are given in Annex 4.

#### 1.4 Election of Chairman.

The RCA Co-ordinator called for nominations for the Chair for the Meeting. Dr. Butt, Pakistan, nominated Dr. Garth Hogg, ANSTO, and this was seconded by Professor Tang, Singapore. Dr. Hogg was elected unanimously.

Dr. Hogg thanked the delegates for the honour of being elected Chairman for the Meeting.

#### 1.5 Acceptance of Agenda.

The Chairman referred the draft Agenda (Annex 5) to the Meeting asking for their comments on its suitability as the agenda for the rest of the meeting. It was noted that the absence of Japanese representation would require some modification to the text but the rest of the document was accepted without further changes.

## **2. SESSION 2: REVIEW OF PROJECT**

Dr. Easey presented an overview of the Project emphasizing the differences between the former UNDP Industrial Project and the present joint UNDP/RCA/IAEA project and the factors that had produced these changes.

He reviewed the various sources of extrabudgetary finance coming to the joint project. He emphasized the need for all investments in the various areas of nuclear technology covered by the project to be recorded by the National Counterparts to quantify the impact and provide a good basis for demonstrating to UNDP and the

other donors the relevance of the technologies being transferred by the project to the national needs. The need to demonstrate the relevance of the technologies to the wider community's requirements was also stated to be an important goal. National Counterparts were asked to record all such information and pass it on through the Chief Technical Officer to the RCA Office. Dr. Easey also reviewed the responsibilities and the importance of the UNDP National Counterparts and the project technical National Co-ordinators in achieving the full potential from the project and in ensuring that all relevant information was available and recorded.

In examining the effective use of the project resources, Dr. Easey questioned whether regional training events were currently structured to ensure that they gave Member States value for the cost of running them. He offered suggestions on how the benefits might be maximized and how the National Counterparts might be integrated in this through the establishment of a formal process of debriefing and reporting at the national institute level. A full text of RCA Co-ordinator's statement is given in Annex 6.

Following this presentation, there was a discussion by the Meeting of some of the issues raised by the RCA Co-ordinator and the Chief Technical Officer. These included the following questions and answers:

- a) What were the criteria for the minimum viable size and minimum infrastructural support for a core group to support each of the five areas of technology in the current project?

It was decided that this varied from country to country and from technology to technology. The Long-Term Experts would be used to try to produce some specific figures.

- b) Should a format be established to guide training course participants on how to report on the event when they returned home to their institute and should this be copied to the National Co-ordinators and Counterparts?

It was agreed that a uniform reporting process was required to ensure that all important areas of feedback on the training event were requested for responses. These reports should be returned to the RCA Office for analysis. They should also be copied to the National Co-ordinators and Counterparts to assist in achieving the maximum national benefit and impact.

- c) Would a newsletter be issued again by the Regional Office for the joint UNDP/RCA/IAEA project and how frequently would it be issued?

It was planned for the newsletter to be a modest document that would give prompt information on relevant events and news. Up to four issues a year could be produced, provided there was adequate information being provided. As previously, the newsletter would be produced and distributed by the Jakarta Regional Office and would be produced by the Chief Technical Officer. All National Co-ordinators and Counterparts were asked to pass on news items suitable for publication to Professor Hien.

## 2.1 Review of individual UNDP, RCA, IAEA and extrabudgetary components.

Dr. Easey reported that the late approval of the project document by UNDP in April 1993 had caused a problem with project implementation because it had not been possible to recruit the two long-term experts and organize two regional training events and a regional demonstration. Nevertheless, around 60% of the 1993 UNDP budget had been spent and the remainder had been accumulated into the 1994 budget to bring the activities back on schedule by the end of 1994.

The implementation of the full expenditure of the IAEA funds had been also affected by the delay in the UNDP decision and the funds, which support the CTO position, were only able to be used in 1994 following Professor Hien's appointment.

The Australian and Japanese extrabudgetary support had been influenced by the delay in the UNDP support but would probably be back in phase by the end of 1994.

He reported that Malaysia had made its first extrabudgetary cash contribution to the project. It was indicated that the funds would support the provision of a Malaysian expert or lecturer in 1995 in the field of NDE, in Tracers in 1996 and in Radiation Technology in 1997.

## 2.2 Discussion on additional possibilities for extrabudgetary inputs from RCA Member States.

China announced that from 1995 their extrabudgetary contribution to RCA would be in cash rather than 'in-kind' as at present. A decision on the exact area for support would be made shortly.

Indonesia said that there had been an announcement at the 16th RCA Working Group Meeting in Bali that they would contribute US\$50,000 to RCA between 1994 and 1997. The exact fields to be covered would be announced later.

Republic of Korea announced that they would be giving an additional US\$200,000 to RCA over the period 1994 to 1997. Consultations were currently going on to decide the exact area to be supported.

Philippines said that they would provide as much financial support as possible within their limited means.

The RCA Co-ordinator urged the other RCA Member States to follow the lead of these new donors from RCA developing countries and make a financial contribution. He pointed out that New Zealand was proceeding with obtaining Government approval to join RCA and, when this was granted, the indications were that they would be financially supporting this joint project.

## 2.3 Review of 1993 Meetings of National Co-ordinators.

Dr. Easey referred the delegates to reports of these Meetings which were contained in the Annexes of the PPER. He then reviewed the highlights of each Meeting.

For the National Co-ordinators Meeting (NCM) on Nuclear Analytical Techniques (NAT), he noted that this was the first time that these National Co-ordinators had met because this was a new regional activity for the RCA Member States. He said the most important outcomes of the NCM were the recommendations and conclusions that:

- . the Nuclear Analytical Techniques (NATs) needed to be backed by accreditation to an international standard in order to have the status to persuade potential users of the relevance and acceptability of NAT measurements.
- . the most appropriate international standard to be adopted for this purpose would be ISO Guide 25 and this would be the basis for regionally harmonized procedures.
- . the order of priority for the types of material to be analyzed for industrialization and environmental pollution was agreed as:

First priority:	airborne particulate matter
Second priority:	sediment and soil
Third priority:	natural water bodies and biological accumulators.

An extract of the NCM report is given in Annex 7.

The NCM for NCS and Tracer Technology was reported to have reviewed all activities in the three output areas and defined all the regional events. The extract from this report is given in Annex 8.

It was reported that the NCM for NDE had reviewed all activities in the two output areas and had made a number of recommendations on aspects of these. The duties for the long-term expert were dealt with specifically. The extract from the report is given in Annex 9.

The highlights of the NCM for Radiation Technology were reviewed. It was noted that there was emphasis in the recommendations on mechanisms for improving aspects of regional training. The extract of the report is given in Annex 10 and covers all activities in the four outputs.

Discussions of these NCMs were amalgamated with the review of the 1993 Project Activities.

#### 2.4 Review of 1993 Project Activities.

All the RCA Member States attending this Meeting submitted Country Statements covering items 2.5 and 3.2 in the Agenda and they are copied in Annexes 11 to 24.

There was general satisfaction amongst the National Counterparts on the 1993 activities.

### **3. SESSION 3: FUTURE PROGRAMME**

#### 3.1 Report on the 16th RCA Working Group Meeting by RCA Co-ordinator.

The RCA Co-ordinator reported on the 16th RCA Working Group Meeting held in Bali, Indonesia from 22-25 March 1994. It was attended by 51 participants from 14 RCA Member States. Only Mongolia was not represented. Singapore was present for the first time in many years. There were 24 participants from Indonesia. The IAEA delegation was led by Mr. Qian Jihui, Deputy Director General, Department of Technical Co-operation. Dr. Djali Ahimsa, Director General, BATAN was elected Chairman for the Meeting.

The highlights of the Working Group Meeting were:

the Meeting accepted and approved:

- the draft RCA Annual Report 1993
- the Action Plan for 1994
- the Budget and Budget Estimates for 1994
- the reviewed draft report for the 16th RCA Working Group Meeting.

additional extrabudgetary support was announced from:

- Indonesia who will give US\$50,000 for the period 1994 to 1997
- Republic of Korea who will give US\$30,000 to US\$50,000 each year in addition to the training course they support
- Philippines who will continue to make a financial contribution.

the Meeting strongly supported the Policy Review Seminar and endorsed the selection of topics. It was considered to be very important for Technical Co-operation projects to be formulated so that they would have an impact nationally or regionally.

the Meeting recommended support for the following in the RCA programme:

- the proposals set out in the Project Formulation Meeting Report for Energy and Nuclear Power Planning with the component on the pooling and analysis of effective strategies for implementation of nuclear power programmes to be separated as a specific project;
- the proposals set out in the Project Formulation Meeting Report for Research Reactor Utilization and specifically the need for the evaluation of neutron radiography facilities in the region;
- the proposal for a CRP on Applied Research on Air Pollution using Nuclear Related Analytical Techniques;
- the proposal for an RCM in 1995 for Air Pollution and Lung Function Studies; and

subject to agreement on detailed project activities:

- the proposal for a new project on Irradiated foods
- the proposal for a CRP on Agriculture Counter Measures
- the proposal for an RCA project on nuclear techniques for renal disorders.

The Meeting requested the Agency to support these and the current programme to the best of its ability, and to examine whether the current level of support for CRPs is commensurate with its obligations under the Articles of the Agreement.

Other matters discussed were:

- . the Agency was requested to expedite the recruitment of the long-term experts for the joint UNDP/RCA/IAEA project RAS/92/073;
- . the Meeting supported further initiatives that would maintain and secure at least the present level of extrabudgetary funding and the establishment of specific emphasis on those initiatives that would contribute to the UN "Women In Development Programme" and would also be relevant to the needs and priorities of RCA;
- . the Meeting formally recorded its appreciation of the contribution of Dr. David Cook to the RCA programme on hearing of his resignation; and
- . the Meeting sent condolences to India on the announcement of the sudden death of Shri R.G. Deshpande, who had been a long-time supporter and contributor to the RCA programme as an expert as well as a national counterpart.



### 3.2 Review of 1994 Work Programme.

Dr. Easey referred to the work programmes as outlined in the reports of the National Co-ordinator Meetings and the Project Document. He noted that there were eight Regional training events scheduled for 1994, two events having been deferred to 1995. With specific reference to the deferred Regional Seminar on Nuclear Analytical Techniques he asked that National Co-ordinators should make contacts with decision makers in analytical laboratories to encourage their participation in this event.

Delegates were invited to make comments on the 1994 programme and on the future programme (item 3.3 on the Agenda). As well as making comments on the various scheduled programme activities, delegates also made additional remarks on items of associated relevance.

Bangladesh reported that the high commercial demand for their NDT services was having an effect on their ability to organize and conduct large numbers of national training events in the various NDT categories.

China requested more co-operation with ANSTO experts in the area of tracer technology and particularly proposed studies on sediment movement in Shanghai harbour. There was a request for a training event on the use of nuclear analytical techniques including accelerator mass spectrometry for analysis of tracer materials in environmental studies and airborne particulate matter. It was announced that there would be an International Conference on Isotopes in Beijing in May 1995 and it was hoped that there would be the opportunity for RCA Member States to participate.

India offered to make available clean room facilities to assist Member States in carrying out some of the more demanding aspects of the nuclear analytical techniques activities.

Indonesia reported that there were currently insufficient level 3 NDT specialists in their country to enable the full national training programme to proceed. There was also a shortage of instruments for neutron activation analysis.

Republic of Korea offered to make available to RCA Member States facilities associated with their new research reactor. They undertook to supply the RCA Co-ordinator with a listing of these and this will then be circulated to all Member States.

Malaysia emphasized the importance of using the hosting of Regional events as a means of informing the general public about the benefits of nuclear techniques and the use of radioisotopes.

Mongolia requested that special consideration be given to their situation which required additional inputs of assistance to enable them to participate fully in the programme and gain the full benefits of the technologies for their economy.

Pakistan offered to share the experiences gained during the upgrade of their research reactor from 5 to 10 MW. This had been done using limited resources and the knowledge and experience gained during this exercise could assist other Member States.

Singapore suggested that a series of training modules could be produced to facilitate technology transfer. Willingness was also expressed to contribute experience and expertise in appropriate project activities.

Sri Lanka informed the delegates about their Government's approval to construct laboratories for their Atomic Energy Authority (AEA). Assistance was requested from the project to aid in the changing emphasis at the AEA towards a research and development programme utilizing more practical skills.

Thailand emphasized the importance of the nuclear analytical techniques component of the programme and especially its links to other scientific work at a national level. Assistance was requested to enable special training to be given to new National Co-ordinators who had had to be appointed because of the "brain drain" of the previous experts to other organizations.

Viet Nam requested that there should be some meeting to discuss the RVNRL results from Viet Nam and Sri Lanka, both of whom had used the CAIR-BATAN facilities in Jakarta to irradiate some 2 tonnes of latex and then carried out large-scale trials on the product.

### 3.3 Future activities.

A question was raised on the effect of the incorporation of the theme of "women in the environment and development" as a component of the RCA future programme on the activities of the joint UNDP/RCA/IAEA project. The RCA Co-ordinator explained that there was a UN priority for this topic and various specialized Agencies were developing programmes to incorporate this item in their medium-term plans. As far as RCA was concerned, there were already three projects that contributed to this imperative within the programme but these had arisen because of their practical importance not because of political considerations. As had been discussed and agreed at the 16th RCA WGM in Bali, it was important for the future viability of RCA to align the common priorities and goals of the Member States with those of other bodies, especially where there might be funding benefits to sustain such projects. This was intended to be done without distortion of the overall RCA programme.

## 4. **SESSION 4: CLOSING SESSION**

### 4.1 Discussion of Project Issues.

National Counterparts were requested to assess their requirements for the country components of the project with regard to experts, lecturers and fellowships and notify the Chief Technical Officer as soon as possible about their requirements. They were reminded that there were only 15 m/months of fellowship assistance and 7 m/months of expert assistance available so that all bids would be assessed on the merits of the proposal.

Dr. Easey emphasized that it was now time to begin to prepare for the Mid-Term Review scheduled for 1995. Following the Mid-Term Review for the UNDP Industrial Project in 1990, there had been complaints from Member States that they had had insufficient opportunity to present the evaluation team with a briefing on their specific country situation and it was necessary to incorporate this type of briefing into the next review. It was decided that all Member States would be asked to provide the Evaluation Team with briefing materials before they carried out their mission.

Dr. Easey suggested that five to six countries would be evaluated in the review and these should be taken to represent the effects on countries at a low, medium and high level of development. The terms of reference of the review were seen to be critical. Since the objectives and the outputs of the project were set out to be training related, it was important that the review should focus on this aspect and consider the efficiency of the project in achieving its outputs.

It was suggested that the Mid-Term Review should be carried out at a suitable time to allow the report to be incorporated into the background papers for the 18th RCA Working Group Meeting in 1996. September/October 1995 were possible target dates but these would be evaluated to ensure that all requirements would be met.

Professor Hien asked the delegates to provide him by mid-May with details of their country plans for this project to ensure that there was an integrated picture of the total expected contribution both regionally and nationally.

Dr. Easey reminded the delegates that two regionally stationed long-term experts would be recruited in 1995 to cover the areas of Nucleonic Control Systems and Radiation Technology and that advertisements would come out by the end of the year.

He also drew the Meeting's attention to the need to make better use of Regional Experts and assist those in developing countries, especially, to get experience in carrying out such missions. He requested delegates to identify prospective Regional Experts who had good technical skills and good communication skills in English language and send him the details. He undertook to prepare and circulate a consolidated list to all National Co-ordinators. This list would act as a good data base for general and specialist areas.

#### 4.2 Other issues

The RCA Co-ordinator was asked to clarify whether the Terminal Report for the UNDP Industrial Project RAS/79/061 and RAS/86/073 had been accepted by the RCA General Conference Meeting.

There was strong support by the delegates for the suggestion that an RCA Seminar similar to that conducted in 1989 should be organized in 1995. The RCA Co-ordinator was asked to raise the matter at the next RCA General Conference Meeting.

#### 4.3 Formulation of conclusions and recommendations

The Meeting made the following conclusions and recommendations which were to be further refined at the Tripartite Review Meeting on 3 May 1994:

- . there were no major issues concerning the project at this stage;
- . the progress of the project in 1993 was acceptable except for the delayed recruitment of the Chief Technical Officer and the two long-term experts;
- . the project plans for 1994 and 1995 were reviewed and agreed. It was concluded that these would meet the project needs;
- . the decisions over the past two years by China, Indonesia, Malaysia, Republic of Korea and Philippines to make cash contributions to the RCA were seen as encouraging signs of increased maturity and commitment of the developing RCA Member States. Other Member States were urged to follow this lead, especially those already making "in-kind" contributions;
- . the importance of the role of all National Counterparts and Co-ordinators in the effective and efficient running of the project continues to require emphasis;
- . the increased use of regional experts needs to be encouraged;
- . there needs to be a full briefing prepared for the experts who will conduct the Mid-term Review in 1995; and
- . the organization of an RCA Seminar in 1995 was considered to be highly desirable.

#### 4.4 Concluding Remarks.

The Chairman expressed his satisfaction at the results of the Meeting and congratulated the delegates on their contribution to such a positive and rewarding outcome. He had very much enjoyed work with the delegates and had enjoyed simulating discussions both in and out of the formal sessions. He said that Australia had been grateful for the opportunity and honour of hosting this Meeting and the forthcoming Tripartite Meeting. He expressed special thanks to Dr. Peter Airey and Ms. Robin Lowerson for their excellent contributions to the organization of both events.

On behalf of the IAEA, Dr. Easey thanked the Government of Australia and ANSTO for agreeing to host the two Meetings. He echoed Dr. Hogg's thanks to Dr. Airey and Ms. Lowerson for their substantial contributions to the successful organization of the events. He thanked the delegates for their strong inputs to the discussions and the constructive way in which the business of the Meeting had been dealt with. He suggested that there was now a very clear view of the past, present and future of the project and this would enable the maximum benefit to be derived from the Tripartite Meeting the next week.

Dr. Hong-Lae Chang, speaking on behalf of the delegates, added their thanks to the Australian Government and ANSTO for hosting the Meeting and for being such good hosts. He also thanked Professor Hien and Dr. Easey for their stimulating discussions.

Dr. Hogg closed the Meeting wishing all delegates an enjoyable and interesting stay and a safe return home.

- **Extract from the Report of the Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Sydney, 3 May 1994.**





**REVIEW MEETING**  
**FOR**  
**THE JOINT UNDP/RCA/IAEA PROJECT FOR ASIA AND THE PACIFIC**  
**ON**  
**"THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN**  
**TECHNOLOGY AND SUPPORT ENVIRONMENTALLY**  
**SUSTAINABLE DEVELOPMENT"**  
**RAS/92/073**

**Hilton Hotel, Sydney, Australia**  
**3 May 1994.**

It had been planned to hold the Tripartite Review Meeting (TPRM) for RAS/92/073 at the Sydney Hilton Hotel on 3 May 1994. In the absence of UNDP representation, it was agreed that the meeting should go ahead on the basis of the circulated agenda (Annex 1) and the report should be sent to UNDP New York, with a request that some suitable mechanism be sought to accept the materials within a TPRM framework and avoid the unnecessary expense of another meeting.

The meeting was attended by 15 participants from 14 RCA Member States, only Japan was not able to send a representative. The IAEA was represented by the RCA Co-ordinator, Dr. John F. Easey and the Chief Technical Officer for the project Professor Pham Duy Hien. The list of those attending is given in Annex 2.

**1. SESSION 1: OPENING**

**1.1 Welcome Remarks**

Dr. Garth Hogg welcomed the participants to the Meeting on behalf of the Government of Australia. He noted that the deliberations at the National Counterparts Meeting held the previous week, 28 and 29 April, would significantly assist in the consideration of the Agenda items.

In the absence of a UNDP representative it was agreed that Dr. Hogg should Chair the meeting.

## 1.2 Remarks by RCA Co-ordinator

Dr. Easey welcomed the participants to the meeting on behalf of the IAEA and thanked the Government of Australia for agreeing to host this important meeting. He noted with regret the absence of any UNDP representation and endorsed the delegates' decision to proceed with the agenda inspite of lack of a formal UNDP representative.

He reviewed the actions that had been taken by the RCA Office to bring about the mandatory TPRM for the project. He advised the participants that the planning for the Tripartite Review Meeting (TPRM) for the joint UNDP/RCA/IAEA project RAS/92/073 had been set in place, when UNDP Headquarters New York were formally requested on 22 April 1993 to agree to having the TPRM in Sydney in May 1994. This was agreed by them on 19 May 1993.

Communications to UNDP New York concerning UNDP representation at the TPRM and the 9th Pacific Basin Nuclear Conference did not result in any feedback to the RCA Office on who would represent them. The production of the agenda in Vienna had been held back so that it could be prepared in consultation with the UNDP representative. In the absence of such a nomination, the agenda was unilaterally produced and distributed to all delegates on 14 April 1994.

The delayed printing of the Project Performance Evaluation Report (PPER) was notified to UNDP New York on 14 March and the report was then sent out from IAEA by courier on 23 March, 6 weeks before the meeting. In order to give the maximum time for review, the PPER was sent directly to the UNDP Resident Representatives and Headquarters as well as the RCA/UNDP National Counterparts. The fax from Mr. Zacharia on 30 March 1994 requesting a lead time of at least four weeks (Annex 3), confirmed that the preparations for the TPRM were on schedule and in conformity with UNDP Headquarters requirements.

Further communications with UNDP Headquarters failed to produce any nomination of who their representative would be. On 27 April the RCA Office was contacted by fax from New York with a request to defer the TPRM to 21 May since it was believed that the project meetings were being held 3-21 May. The reply to New

York informed them that the National Counterparts Meeting was already underway and that the TPRM was scheduled only for 3 May, so that slippage to 21 May was not possible. No further communication had been received by Dr. Easey to further inform on the situation before the start of the scheduled TPRM.

He briefly reviewed the purpose of a Tripartite Review Meeting and referred the delegates to the Project Performance Evaluation Report which had been circulated to them as well as their UNDP country offices. He noted that all delegates had received their PPERs without any problems.

## **2. SESSION 2: ADMINISTRATIVE**

### **2.1 Review of Project Concept and Design**

Dr. Easey referred to the overview of the project he had presented earlier at the National UNDP Counterparts Meeting which discussed the differences between the present and the past UNDP funded projects, the funding of the project, the role of the National Counterparts and National Co-ordinators and the effective use of resources (Annex 4).

He also referred the delegates to Section II of the PPER which set out the two immediate objectives and the ten outputs from the original project document.

### **2.2 Progress Report for 1993**

The Chief Technical Officer, Professor Hien referred delegates to the previous discussions on the project progress during 1993 that had taken place during the National Counterparts Meeting and pointed out that the documentation on the various events that was set out in the PPER.

It was noted that the late approval of the project document by UNDP in April 1993 had prevented the full implementation of the 1993 programme, particularly the regional training events and the two UNDP funded long-term experts. Nevertheless, strong co-operation, both inside and outside the IAEA, had enabled around 60% of the 1993 UNDP budget to be spent.

### 2.3 Project Plan for 1994 and 1995

Delegates were reminded that the decisions on the future programme of activities were set out in the reports from the four National Co-ordinators Meetings held in 1993 and that the uncompleted 1993 programme was going to be included in the 1994 programme, to avoid or minimize any carry over to the 1995 programme.

The extrabudgetary support from Australia and Japan had been included in the discussions at the National Co-ordinators Meetings. The IAEA support would continue for the post of Chief Technical Officer and it was the intention to maintain this as a post located at an appropriate nuclear research institute in the region.

### 2.4 Discussion of Project issues.

The Country Statements presented at the National Counterparts Meeting (NCM) 28 and 29 April were thought to be the most relevant records of each country's formal evaluation of the 1993, the 1994 and future programmes. These are attached in Annexes 5 to 18.

Other issues had been raised at the NCM.

National Counterparts were requested to assess their requirements for the country components of the project with regard to experts, lecturers and fellowships and notify the Chief Technical Officer as soon as possible about their requirements. They were reminded that there were only 15 m/months of fellowship assistance and 7 m/months of expert assistance available so that all bids would be assessed on the merits of the proposal.

Dr. Easey emphasized that it was now time to begin to prepare for the Mid-Term Review scheduled for 1995. Following the Mid-Term Review for the UNDP Industrial Project in 1990, there had been complaints from Member States that they had had insufficient opportunity to present the evaluation team with a briefing on their specific country situation and it was necessary to incorporate this type of briefing into the next review. It was decided that all Member States would be asked to provide the Evaluation Team with briefing materials before they carried out their mission.

Dr. Easey suggested that five to six countries would be evaluated in the review and these should be taken to represent the effects on countries at a low, medium and high level of development. The terms of reference of the review were seen to be critical. Since the objectives and the outputs of the project were set out to be training related, it was important that the review should focus on this aspect and consider the efficiency of the project in achieving its outputs.

It was suggested that the Mid-Term Review should be carried out at a suitable time to allow the report to be incorporated into the background papers for the 18th RCA Working Group Meeting in 1996. September/October 1995 were possible target dates but these would be evaluated to ensure that all requirements would be met.

Professor Hien asked the delegates to provide him by mid-May with details of their country plans for this project to ensure that there was an integrated picture of the total expected contribution both regionally and nationally.

Dr. Easey reminded the delegates that two regionally stationed long-term experts would be recruited in 1995 to cover the areas of Nucleonic Control Systems and Radiation Technology and that advertisements would come out by the end of the year.

He also drew the Meeting's attention to the need to make better use of Regional Experts and assist those in developing countries, especially, to get experience in carrying out such missions. He requested delegates to identify prospective Regional Experts who had good technical skills and good communication skills in English language and send him the details. He undertook to prepare and circulate a consolidated list to all National Co-ordinators. This list would act as a good data base for general and specialist areas.

The delegates were asked whether they had been contacted by their UNDP Offices concerning the PPER. China, Indonesia, Pakistan and Thailand reported that they had responded to the request for comment by the 14 April deadline. Malaysia reported that they had been contacted on 13 April for the 14 April deadline and had not been able to comply with it and Philippines had been in a similar position. Republic of Korea, Sri Lanka and Singapore had not received any request from their UNDP Office. The other delegates did not have the required information.

An additional item raised during discussions related to the training opportunities for technicians within the project and RCA generally. It was pointed out that these are a class of workers who perform essential tasks keeping the research and development programmes running effectively but receive little attention from the project. The RCA Co-ordinator gave an example of Member States' failure to respond adequately when requested to nominate technicians for a regional training event. Several delegates pointed out that often the technicians did not have the required knowledge of English to be suitable applicants and that it might be more beneficial for their specific needs to be attended to through national training or perhaps fellowships.

### **3. SESSION 3: CLOSING**

#### **3.1 Decisions and Recommendations**

The decisions and recommendations of the meeting were:

- . There were no major issues concerning the project at this stage;
- . the progress of the project in 1993 was acceptable except for the delayed recruitment of the Chief Technical Officer and the two long-term experts;
- . the project plans for 1994 and 1995 were reviewed and agreed. It was concluded that these would meet the project needs;
- . the decisions over the past two years by China, Indonesia, Malaysia, Republic of Korea and Philippines to make cash contributions to the RCA were seen as encouraging signs of increased maturity and commitment of the developing RCA Member States. Other Member States were urged to follow this lead, especially those already making "in-kind" contributions;
- . the importance of the role of all National Counterparts and Co-ordinators in the effective and efficient running of the project continues to require emphasis;

- . the increased use of regional experts needs to be encouraged;
- . there needs to be a full briefing prepared for the experts who will conduct the Mid-term Review in 1995; and
- . the RCA Co-ordinator liaise with UNDP Headquarters to enable the formalities of the Tripartite Review Meeting to be addressed with the minimum expenditure of project resources.

### 3.2 Closing Remarks

The Chairman, Dr. Hogg, thanked the delegates for their contributions and their positive attitude in such a difficult situation. He believed that everyone present had done as much as was possible to ensure that all aspects of the project had been thoroughly examined and commented on. He hoped that the meeting report would be accepted by UNDP and provide the basis for the formal TPR. He concluded by wishing all delegates a safe journey home and hoped that they would take back pleasant memories of their time in Australia.

Dr. Easey thanked the Government of Australia for the support it had given to the meeting and expressed his gratitude to Dr. Hogg and the other ANSTO staff who had made significant contributions to the provision of assistance and the organization of the event. In concluding, he endorsed Dr. Hogg's comments on the contribution of the delegates to the positive nature of the meeting and hoped there would be an equally positive response by UNDP.





- **Extract from the Report of the Tripartite Review Meeting for the joint UNDP/RCA/IAEA Project RAS/92/073, Vienna, 24 September 1994.**



**TRIPARTITE REVIEW MEETING**

**FOR**

**THE JOINT UNDP/RCA/IAEA PROJECT FOR ASIA AND THE PACIFIC**

**ON**

**"THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN**

**TECHNOLOGY AND SUPPORT ENVIRONMENTALLY**

**SUSTAINABLE DEVELOPMENT"**

**RAS/92/073**

**IAEA-Vienna, 24 September 1994**

The Meeting was attended by 22 participants from 13 RCA Member States. Mongolia, Myanmar, Singapore and Viet Nam did not send representatives. The RCA Co-ordinator, Dr. John F. Easey, and the project's Chief Technical Officer, Professor Pham Duy Hien participated as the IAEA representatives and UNDP was represented by Mr. Will Scholl, Regional Programme Manager and Mr. Paul Steinmeyer, technical advisor. There were 11 IAEA staff members present as observers. The full list of those attending is attached as Annex 1.

**1. SESSION 1: OPENING**

The Co-Chairmen for the Meeting were Professor A. Djaloeis, Deputy Director General, Indonesian National Atomic Energy Agency (BATAN) and Mr. Scholl. Mr. Scholl made a brief opening statement outlining the issues of importance to UNDP. He emphasized the need for the promotion of benign technologies and stressed the UNDP's Executive Boards calls for concentrated efforts in the priority areas of:

- . environment;
- . employment creation;
- . poverty alleviation; and
- . women in development.

He explained that the Meeting should try to focus on further improving the project design and achieving compliance with the stated UNDP priorities. He ask the participants to think how changes might be made to the present programme to secure:

- . increased involvement and participation by the private sector;
- . the sustainability of the investments in the project beyond its termination date;  
and
- . the further emphasis on the involvement of women in the projects.

He reminded the Meeting that UNDP can also assist in the project work through such roles as facilitating technology transfer. He noted that, as well as bringing about changes in technology for the scientific and technical communities in the region, there must also be some concerted efforts made to ensure that the benefits and achievements were made known to those involved in non-technical areas such as policy making. He emphasized that, since the project was extremely technical in nature, appreciation of the detail and the benefits accruing, were not obvious to the lay persons and this was aggravated by the poor profile of most subjects involving the publicly emotive subjects of nuclear issues and radiation.

## **2. SESSION 2: WORKING SESSION**

The draft Agenda (Annex 2) was accepted without change.

### **a) Presentation of the PPER**

Dr. Easey referred to the PPER which had been circulated to all RCA National Co-ordinators and Member States in accordance with UNDP procedures and all participants had copies. He noted that, inspite of the late start in the project in mid-1993, there had been a very rapid response and effective implementation of most of the activities, as was detailed in the PPER.

### **b) Presentation of the Draft Report of the Review Meeting, Sydney, 3 May 1994**

The draft report had been circulated to Member States through the National Co-ordinators and all Meeting participants had received a copy. Dr. Easey noted that no specific substantive programmatic or implementational issues had been raised at either the Review Meeting or the National Counterparts Meeting that had been held 28-29 April 1994. The main concern had been about the improvement of communications with UNDP Headquarters.

Dr. Easey emphasized the strong alignment of the UNDP priority areas with those of the project as set out in the current Project Document. He suggested that the strong RCA networking and the commitment of Member States to RCA, through the intergovernmental agreement, would greatly assist in securing implanted technology and assuring self-sufficiency.

Mr. Scholl assured the Meeting that the former communication problems had now been overcome. He agreed on the importance of having strong and effective networks and said that such linkages were important in enabling bilateral assistance to be taken up by the more advanced developing countries. He again emphasized the need to make the decision makers and policy makers aware of the technologies being brought in through the project activities. The need for a more rigorous examination of success criteria and the establishment of evidence of success were seen to be areas that needed urgent attention.

c) Discussion on PPER and Review Meeting

There was a full and thorough discussion by all Member States' delegates of the issues raised in the reports and in the comments by Mr. Scholl and Dr. Easey. There was unanimous agreement that the project was contributing significantly to the individual countries in the application of nuclear techniques to industrial and environmental issues. It was recognized that there was more that could be done on the issue of informing the decision makers, policy makers and the general public on the significance of the work. It was noted that one aspect that could assist in the securing of self-sustainability of the technology, once the project had concluded, would be to invest some efforts towards assisting technicians to be trained in the technologies. All recognized the important function of the technician in the use and development of technology and in achieving self-sufficiency.

Mr. Scholl said that he readily recognized the importance attributed to the Project by Member States. One indicator of that support was the readiness of Member States to cost share. It was noted that the programme received major support from Australia, Japan and Malaysia and that upto seven other Member States were now going to make cash contributions to RCA from 1995. All Member States made significant 'in-kind' contributions which greatly supported and assisted the project. The role the regions' developing countries played in the programme was significant in the promotion of TCDC. Additionally, it was hoped that those countries that had achieved a reasonable degree of self-sufficiency, through the transfer of technology, would now take on a role assisting countries with more limited infrastructure.

It was seen however, that the project's success should not solely be assessed in financial terms. The transfer of technology, in responding to a real or perceived technology gaps, should focus on strengthening indigenous capacity. The success of the transfer rested on its sustainability.

He noted the delegates' support for increased emphasis on undertaking awareness and promotional activities to inform a wider cross-section of the community on the beneficial impact of this project.

### **3. SESSION 3: WORK PLAN**

A draft Work Plan for the second half 1994 and all 1995 was tabled (Annex 3). Professor Pham Duy Hien commented that he had experienced difficulty in getting National Co-ordinators to submit their needs at the National level and only five countries had responded before the meeting. Some changes would therefore be required before it could be finalized.

It was noted that this plan should now be modified to take account of the comments by Member States and the revised Work Plan would be prepared by the RCA Co-ordinator, once the modalities for achieving the new initiatives had been developed in discussions outside of the Meeting.

### **4. SESSION 4: FUTURE ACTIVITIES**

Delegates emphasized the need for documenting project impact and especially the influence on the end user. The development and transfer of technologies to the end user was noted as a goal for all Member States and it was expected that good use could be made of the National Co-ordinators Networks to promote the technologies and move them away from Research and Development to the end user. Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand all reported successful transfer of the technology with varying degrees of success in its commercialization.

It was noted by the delegates that, the aims and objectives of the project were most obviously linked to the environment. All four elements of: environmental regeneration; poverty reduction; employment generation; and women in development were being addressed to varying degrees thus responding to and supporting the UNDP's new Mandate on Sustainable Human Development (SHD). The spectrum of the uses of the

technology had a broad impact notably on industry, health, environment which together with the project's strong emphasis on capacity building, was also responding to the SHD imperative. Member States noted that adequate training for technicians in basic radiation protection practices was essential to ensure safety in the work place. The concern for occupational safety was also discussed in some detail.

Mr. Steinmeyer commented on the need for standardized training programmes and the need for the development of standards and certification procedures in some areas. He suggested that a trained worker was the first step in the development of public acceptance programmes since each would contribute as an ambassador for the technology and contribute at the "grass roots" level to pass on favourable information and opinions.

Professor Djaloëis remarked that efforts need to be made to get the greatest impact possible and this has to be done by explaining in lay person and cost benefit terms. A common strategy was needed to ensure that a properly constructed approach was taken. Seminars were required to inform on how and what to do to achieve effectiveness in public acceptance and information programmes.

Professor Hien suggested that more benefits could result from the projects' inputs into training events, if there were increased efforts in the monitoring and follow-up of their participants.

Mr. Scholl said that the establishment of success criteria and their quantification was now a much more important subject than it had been in the past. The previous measures of success, such as tabling capital investment, were now seen to be not sufficiently rigorous. He expressed his satisfaction at the initiatives that had been taken by RCA in setting up a Questionnaire to monitor inputs and record activities on a systematic and comprehensive basis (Annex 4). He suggested that such a development and the establishment of a data bank from the records would represent a significant improvement in the monitoring and analysis of the project's performance. Additional information was provided by Pakistan and Philippines who had both been part of the expert group involved in the design and formulation of the Questionnaire. Mr. Scholl congratulated those who had contributed to the document and said that this aspect had strong UNDP support.

## **5. SESSION 5: OTHER BUSINESS**

Mr. Scholl questioned whether the role of the National Co-ordinators was sufficiently well defined for them to be fully aware of what was expected of them. He added that their Governments needed to be aware of these duties and obligations. Dr. Easey said that this had been dealt with in other reports but, in order to further reinforce the point, there would be a restatement in the TPR report (Annex 5).

Although they had only joined RCA on 14 July 1994, New Zealand confirmed their strong interest in the project and indicated that their major contribution would be to further support it both technically and financially. Note was taken of the possibility of hosting the Mid-Term Review in New Zealand in early July 1995 and an official Government communication would be sent in due course.

Mr. Scholl noted the paper submitted by Dr. Easey (Annex 6) as a response to the Terms of Reference circulated for the UNDP's Mid-Term Review (MTR) of the Fifth Intercountry Programme for Asia and the Pacific, due to take place at the end of 1994 (Annex 7). He informed participants that this review would be on thematic issues and would be presented to their Executive Board for incorporation in future programming. It was noted that there might well be upward or downward budget changes to projects following this MTR and every project would have to prove its worth. It was also probable that the 6th cycle might be quite different in concept to the present cycle.

## **6. SESSION 6: CONCLUDING SESSION**

Mr. Scholl thanked all the participants for their forthright contributions to the full discussions that had taken place. He said that he had learned a lot on the technical aspects which had encouraged him greatly on the future for the technology and its contribution to the region. This insight needed to be passed on as quickly as possible to others to enable them to be better informed.

He advised the participants that the next actions were for IAEA to prepare a report complete with recommendations which would also be reflected in a revised work plan. This would go to UNDP and subsequently to the Governments for approval. In the meantime because of the need to respond rapidly, the new ideas should be translated into project activities which would be implemented once official approval was obtained.



In conclusion he thanked the Co-Chairman Professor Djaloeis, the delegates and the observers for making themselves available on a Saturday to enable the TPR to be held and for their contributions to a stimulating and rewarding meeting.

## **7. CONCLUSIONS AND RECOMMENDATIONS**

The following conclusions and recommendations were made by the Meeting:

- . UNDP's call for concentrated efforts to support their mandate on Sustainable Human Development was noted and it was agreed that criteria would have to be established for measuring the project's performance and success in this aspect;
- . it was agreed that the programme should be adjusted as quickly as possible to give added emphasis to promotion and awareness programme activities on the technologies directed at decision makers, senior policy makers and the general public. This would ensure better appreciation and utilization of the project's investment. National Counterparts and Co-ordinators would have an important role to play in these programmes;
- . it was agreed that the programme should be adjusted as quickly as possible to make provision for a new initiative for the training of technicians in the technologies being introduced;
- . it was identified that there was a training requirement for workers who, though not directly involved with nuclear technology, were employed in industries and concerns where the technology was being used. Plant works, supervisors and managers were all possible target groups.
- . it was recommended that the work plans be revised to take account of these changes;
- . the progress of the project in 1993 was acceptable except for the delayed recruitment of the Chief Technical Officer and the two long-term experts;

- . the decisions over the past two years by China, India, Indonesia, Malaysia, Republic of Korea, Philippines and Thailand to make cash contributions to the RCA were seen as encouraging signs of increased maturity and commitment of the developing RCA Member States. Other Member States were urged to follow this lead, especially those already making "in-kind" contributions;
- . the importance of the role of all National Counterparts and Co-ordinators in the effective and efficient running of the project continues to require emphasis; and
- . the increased use of regional experts needs to be encouraged.

- **Fax to Mr. Willi Scholl on "Implementation of Recommendations from Tripartite Review Meeting", RAS/92/073, 23 November 1994.**





INTERNATIONAL ATOMIC ENERGY AGENCY  
Department of Technical Co-operation  
**DIVISION OF TECHNICAL CO-OPERATION PROGRAMMES**  
Facsimile No. 43 1 230 9633

F a c s i m i l e   M e s s a g e

<b>Ref. No. RAS/92/073</b>	
<b>Date: 23 November 1994</b>	<b>No. of Pages: 8</b>
<b>To:</b> <b>Mr. Willi Scholl</b> <b>Regional Programme Manager</b> <b>RPD/RBAP</b> <b>UNDP</b> <b>One United Nations Plaza</b> <b>New York, N.Y. 10017</b>  <b>Fax: (212) 906-5825 and (212) 906-5898</b>	<b>From:</b> <b>John F. Easey</b> <b>RCA Co-ordinator</b> <b>Vienna, Austria</b>
<b>cc: Mr. Lodding</b> <b>Mr. Kastens</b>	<b>Authorization: John F. Easey</b>  <b>Clearance:</b>

Dear Mr. Scholl,

**Subject: Implementation of Recommendations from Tripartite Review Meeting, RAS/92/073.**

Please find attached an outline of the proposals for incorporating the initiatives on promotion/public awareness and technician training that were the additional tasks recommended by the TPR.

Because of the short time that has been available to fully develop the approaches with the required experts, it is not possible to be specific on every aspect. As far as determining the order of visiting countries, this is being negotiated at the moment.

As far as the public acceptance/promotional programme, I have had discussions with an expert in Washington DC and we have devised a strategy which would require one week in each country: Day 1 - review organization; Days 2 and 3 - National Workshop; Day 4 - National Seminar; Day 5 - Review.

Two countries would be visited at a time. The first two would be Republic of Korea and India since these have probably the best set up units for Public Information.

The objective, Output, Activities and details for both events are attached. It should be possible to cover eight of the fourteen developing countries in RCA in 1995 and complete the remaining 6 in 1996.

For the technician training programme, the Objective Output and Activities required are attached. Activity 1 has already been carried out. It is hoped to have sufficient information to carry out the first visits in February/March. Again it is planned to visit countries in pairs, eight countries in 1995 and six in 1996. Each country visit would take one week - Day 1 - review host organization; Day 2 - National Workshop; Day 3 - review open and distance learning Agency; Day 4 - National Seminar; Day 5 - Review.

The cost for both exercises is estimated at around \$400,000. There is little scope for extracting this from the available budgets for 1995 and 1996 without undermining the viability of the other outputs. It would therefore be necessary to request these additional funds from UNDP.

I would be most grateful for your comments on these matters as we are faced with considerable time constraints in getting everything set up.

Best regards,

**Objective:**

To increase the effectiveness and national capabilities for undertaking promotional and public awareness programmes on the benefits and the potential of the projects technologies for application to problems of national significance or importance.

**Output:**

Recommendations on the strategies for specific national programmes in promotion and public awareness of the projects' technological benefits.

**Activities:**

1. Expert review of status of public information/promotion units in national institutes
2. National Workshops on promotion and public awareness strategies
3. National Seminars on promotion and public awareness for Managers and Decision Makers in relevant Governmental and International Agencies

**Workplan:**

- 1995 - Visits to 8 countries starting around February/March (countries to be visited in pairs)
- 1996 - Visits to 6 countries.

**National Workshop - Promotion and Public Awareness.****Participants:**

National RCA Co-ordinator  
UNDP Project Counterpart  
National Technical Co-ordinators

- . Non-destructive Testing
- . Radiation Technology
- . Nuclear Analytical Techniques
- . Tracers/Nucleonic Control Systems

Director of Public Information and appropriate staff.

**Resource Personnel:**

RCA Co-ordinator; 2 consultants.

**Programme: (2 days)**

**Day 1:**

- . Review of Technical Co-ordinators' present promotional/public awareness presentations;
- . Review of Public Information capabilities of Institute;
- . Development market strategy in group sessions;

**Day 2:**

- . Review of developed plans
- . Public Information overview of new requirements
- . Trial presentations
- . Review and reporting

**Purpose:**

- . To link the National Co-ordinators promotion and public awareness programmes to the capabilities of their Public Information Units and prepare, under guidance of overseas experts, upgraded strategies for future efforts in these areas.

**National Seminar - Promotion and Public Awareness**

**Participants:**

- . UNDP planning staff at Country Office
- . National representatives from Ministries (involved in planning)
- . participants to National Workshop



**Resource Personnel:**

as National Workshop

**Programme (1 day)**

- . Presentations by each of 4 National Technical Co-ordinators on the benefits of their technology
- . Discussions on presentations
- . Discussions on needs of the participants for information, dialogue and consultation with the National Co-ordinators.

**Objective:**

To support the setting up of technician training programmes in the applications of nuclear technology using open and distance learning techniques.

**Output:**

Recommendations on specific national strategies for the establishment of open and distance learning programmes for training of technicians and support staff in applications of nuclear technology.

**Activity:**

1. Circulation of questionnaire to National Co-ordinators to assess the specific conditions for technician and support staff vocational training at their institutes.
2. Analysis of responses to questionnaire by education experts.
3. Expert assessment visits to Member States.
4. National Workshops/Seminars on the Use of Open and Distance Learning Programmes.

**Workplan:**

- 1995 - Visits to 8 countries starting around February/March (Countries to be visited in pairs)
- 1996 - Visits to 6 countries

**National Seminar - Open and Distance Learning (ODL)**

**Participants:**

National RCA Co-ordinator  
UNDP Project Counterpart  
National Technical Co-ordinators

- . - Non-Destructive Testing
- . Radiation Technology
- . Nuclear Analytical Techniques
- . Tracer/Nucleonic Control Systems

Staff Involved in Training Programmes.

**Resource Personnel:** 2 consultants

**Programme (1 day)**

- . Review of nature of ODL
- . Presentation of sample materials
  - written
  - audio
  - visual
  - computer based.
- . Information on benefits of ODL

**Purpose:**

To brief the National Co-ordinators and associated trainers on ODL and give them examples of ODL materials in various media as a preparation for the National Workshop on ODL for technical vocational training.

**National Workshop - Open and Distance Learning for Technical Vocational Training**

**Participants:**

Participants for National Seminar Representatives from:

- open universities
- higher education Institutes

**Resource Personnel:**

as National Seminar

- . Review of training needs at vocational level for the programme
- . Review of current training possibilities
- . Discussion of expansion of opportunities using ODL and other mechanisms
- . Formulation of possible strategies and options.

**Purpose:**

To link the National Co-ordinators with the national expertise in ODL and examine the mechanisms and possibilities for establishing vocational training in the areas of identified need.

**Cost Estimate:**

**1) Promotion and Public Awareness**

Consultants (2)

Airfare 2x\$4,000	\$ 8,000
DSA 2x14x\$150	\$ 4,200
Fee 2x14x\$350	\$ 9,800
Incidentals 2x\$1,500	\$ 3,000
<b>Sub-total</b>	<b><u>\$ 25,000</u></b>

RCA Co-ordinator

Airfare \$4,000	\$ 4,000
DSA 14x\$150	\$ 2,100
<b>Sub-total</b>	<b><u>\$ 6,100</u></b>

**Grand Total for 7 visits** **\$217,700**

**2) Technician Training**

Consultants (2)

Airfare-2x\$4,000	\$ 8,000
DSA 2x14x\$150	\$ 4,200
Fee 2x14x\$350	\$ 9,800

Incidentals 2x\$1,500	\$ 3,000
<b>Sub-total</b>	<b><u>\$ 25,000</u></b>

**Grand Total for 7 visits** **\$175,000**

- **Fax from Mr. S. Zacharia on UNDP budget cuts, 30 November 1994.**





UNITED NATIONS DEVELOPMENT PROGRAMME  
REGIONAL BUREAU FOR ASIA AND THE PACIFIC  
1 United Nations Plaza, New York, NY 10017

Fax No: (212) 906-5825 and (212) 906-5898

### F A C S I M I L E

<b>To:</b> Mr. John F. Easey RCA Co-ordinator Austria, Vienna	<b>Date:</b> 30 November 1994	
	<b>Fax No:</b> 43-1-230-9633	
<b>From:</b> Sebastian Zacharia Chief RPD/RBAP, UNDP, New York	<b>Signed:</b>	
	<b>File:</b> RAS/92/073	
<b>Subject:</b> RAS/92/073 - The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development	<b>Pages:</b> /	

### **U R G E N T**

Please refer to Mr. Lodding's fax dated 16 November 1994 and the attached mandatory revision. In this context, I would like to refer to my letter dated 5 August 1994. In view of the current 30% freeze on programme funds and the financial constraints currently applicable for allocating programme resources, all programming and borrowing from the next cycle's allocation have been eliminated for the time being. In view of this, we are obliged to review our financial commitments for the 1992-1996 IPF Cycle. We are also obliged to limit the budgets to an expenditure target which, at this time, we cannot exceed. We regret to advise therefore that the allocation for the programme in reference for 1995 cannot exceed \$558,180.00 including any rephasals from 1994 to 1995. As you may recall the possibility of budgetary cuts was raised by Mr. Scholl during the recent Tripartite Review which was held in Vienna on 24 September 1994. We would therefore appreciate your indicating to us how you would like to distribute the reduced allocation between the various budgetary components in such a way so as to ensure that this will not affect the integrity of the programme also taking into account cost-sharing possibilities.

This arrangement will be reviewed by the middle of next year or as funds become available. Meanwhile, stringent measures have to be taken at this time for which we request your usual kind cooperation.

Best regards.





- **Fax to RCA Co-ordinators:**



SUBJECT: TRIPARTITE REVIEW MEETING, VIENNA, 24 SEPTEMBER 1994.

I WILL BE SHORTLY ISSUING THE REPORT OF THE TRIPARTITE REVIEW MEETING HELD IN VIENNA ON 24 SEPTEMBER. IT WAS A VERY USEFUL MEETING WHICH BROUGHT TO A CLEAR FOCUS THE NECESSITY FOR SOME NEW INITIATIVES AND THE INTENSIFICATION OF SOME EXISTING ACTIVITIES.

AS PART OF THE OVERALL DESIGN OF THIS CURRENT JOINT UNDP/RCA/IAEA PROJECT THERE ARE TWO IMPORTANT QUESTIONS THAT NEED TO BE ADDRESSED:

. WHAT IS BEING DONE TO ENSURE THAT THE MAXIMUM APPROPRIATE USE IS MADE OF THESE TECHNOLOGIES IN THE NATIONAL AND REGIONAL CONTEXT?

. WHAT IS BEING DONE, TO ENSURE THAT THE INVESTMENTS IN MANPOWER AND TECHNOLOGY MADE DURING THE PROJECT WILL CONTINUE TO YIELD RESULTS ONCE THE PROJECT CEASES?

THERE IS MUCH THAT COULD BE WRITTEN ON BOTH OF THESE QUESTIONS, HOWEVER, IT IS QUITE CLEAR THAT THE REQUIRED RESPONSES LARGELY HAVE TO BE MADE AT THE NATIONAL LEVEL.

DEALING WITH THE QUESTION OF MAKING MAXIMUM APPROPRIATE USE OF THE TECHNOLOGIES, THERE APPEARS TO BE ATLEAST TWO FACETS:

. INFORMATION

- WHO KNOWS ABOUT THE TECHNOLOGY AND THE BENEFITS THAT CAN BE DERIVED FROM ITS USE?

- ARE THERE ESTABLISHED MECHANISMS FOR INFORMING OTHERS ABOUT THIS ON A REGULAR BASIS?

- WHO IS INVOLVED, THE INSTITUTE, OTHER SIMILAR INSTITUTES, PROFESSIONAL BODIES, INDUSTRIES AND ENVIRONMENTAL AGENCIES, GOVERNMENT PLANNING UNITS, INTERNATIONAL AGENCIES SUCH AS UNDP COUNTRY OFFICES?

- WHAT IS BEING DONE TO PROMOTE THE TECHNOLOGY AND ITS BENEFITS TO THE POTENTIAL USERS OF THE TECHNOLOGY.

. MANPOWER DEVELOPMENT

- WHAT IS BEING DONE TO PASS ON THE TRANSFERRED TECHNOLOGY TO OTHERS AT THE NATIONAL LEVEL?

- ARE THERE MECHANISMS IN PLACE TO ENSURE THAT THIS CAN HAPPEN WITHIN INSTITUTES, BETWEEN INSTITUTES AND IN THE UNIVERSITY AND HIGHER EDUCATION ENVIRONMENT?

ON THE QUESTION OF SUSTAINABILITY RAISED IN THE SECOND POINT, THERE ARE ALSO ATLEAST TWO FACETS THAT SHOULD BE MENTIONED:

. TRAINING

- HAS PROVISION BEEN MADE FOR VOCATIONAL TRAINING, PARTICULARLY OF TECHNICIANS, IN THE USE OF THE TECHNOLOGIES?

- ARE THERE ANY QUALIFICATION OR CERTIFYING PROCEDURES IN PLACE OR PLANNED TO COVER SUCH SPECIALIZATION?

-  
COLLABORATION

- WHAT LINKS ARE BEING OR HAVE BEEN ESTABLISHED WITH OTHER USERS OR POTENTIAL USERS OF THE TECHNOLOGIES AT THE NATIONAL LEVEL?
- HAVE LINKS BEEN MADE SO THAT ASSISTANCE CAN BE RECEIVED FROM OR GIVEN TO OTHERS AT A REGIONAL OR SUBREGIONAL LEVEL AMONG THE RCA MEMBER STATES.

-  
AT SOME TIME THESE AND MANY MORE QUESTIONS NEED TO BE ANSWERED. IN THE SHORT-TERM THERE ARE SOME ACTIONS THAT WILL NEED TO BE TAKEN BY THE PROJECT THROUGH THE SCHEDULING OF ACTIVITIES TO ADDRESS SPECIFIC POINTS.

IF IS HIGHLY PROBABLE THAT THE SITUATION IN EVERY RCA COUNTRY IS DIFFERENT AND THAT THERE WILL BE A WIDE VARIATION IN THE STATUS OF EVEN THE INDIVIDUAL TECHNOLOGY AREAS. IT APPEARS THAT MUCH THAT HAS TO BE DONE, CAN ONLY BE ACHIEVED AT THE NATIONAL LEVEL AND SO STRATEGIES WILL BE PUT IN PLACE TO ADDRESS THESE ISSUES AT THAT LEVEL. IT IS ALSO CLEAR THAT ADDITIONAL ASSISTANCE IS GOING TO BE REQUIRED TO CARRY OUT SOME TASKS AND THIS ASPECT WILL ALSO BE COVERED IN THE PLANNING.

FROM THE OUTPUT OF THE TPR, THE AREAS FOR IMMEDIATE ATTENTION ARE:

- PROMOTION AND PUBLIC AWARENESS OF THE TECHNOLOGIES
- TRAINING OF TECHNICIAN AND WORKERS.

-  
FOR PROMOTION AND PUBLIC AWARENESS, IT IS PROPOSED TO STRUCTURE THE APPROACH AS FOLLOWS:

- THERE IS AN OVERALL NEED TO 'DEMISTIFY' THE TECHNOLOGY AS FAR AS THE NON-SCIENTIFIC AUDIENCE IS CONCERNED.
- THE PROFILE OF THE PROJECT AND THE TECHNOLOGIES NEEDS TO RAISED WITH THE UNDP COUNTRY OFFICES AND THE POLICY MAKING AND PLANNING UNITS FOR THE APPROPRIATE GOVERNMENT DEPARTMENTS SO THAT ESPECIALLY THE SENIOR DEVELOPMENT ADVISORS ARE AWARE.
- INDIVIDUAL COUNTRIES WILL BE REQUESTED TO PROVIDE INFORMATION ON SPECIFIC ASPECTS OF THEIR PROMOTIONAL AND PUBLIC AWARENESS PROGRAMMES TO BRIEF IAEA EXPERTS ON THE LOCAL SITUATION. ARRANGEMENTS WILL THEN BE MADE FOR THERE TO BE A NATIONAL WORKSHOP INVOLVING THE UNDP NATIONAL COUNTERPARTS AND THE FOUR TECHNICAL CO-ORDINATORS AS WELL AS OTHERS INVOLVED IN THE PROMOTION OF TECHNOLOGY.

THE PROMOTION AND PUBLIC AWARENESS STRATEGIES WILL BE REVIEWED WITH THE ASSISTANCE OF IAEA EXPERTS AND A PLAN OF ACTION DEVELOPED TO ENCOMPASS THE TPR RECOMMENDATIONS.

DURING THIS MISSION IT WOULD BE HOPED THAT THE IAEA EXPERTS, ASSISTED BY THE NATIONAL CO-ORDINATOR, COULD MAKE PRESENTATIONS TO REPRESENTATIVES FROM UNDP AND RELEVANT GOVERNMENT DEPARTMENTS AND INITIATE THE EFFORTS TO RAISE THE PROJECT PROFILE WITH THEM.

-

AS FAR AS THE TECHNICIAN AND WORKER TRAINING ASPECT IS CONCERNED, THERE IS A NEED FOR INFORMATION ON THE LOCAL SITUATION WITH RESPECT TO THE POLICY AT THEIR WORK PLACE ON VOCATIONAL TRAINING. BECAUSE OF THE COMPLEXITIES WITH THE WIDE RANGE OF SKILLS BEING TRANSFERRED ASSOCIATED WITH THE PROJECT, IT WOULD NOT BE FEASIBLE TO PRODUCE THE INDIVIDUAL TRAINING PROGRAMMES. NEVERTHELESS, IT WOULD BE POSSIBLE TO ASSIST IN THE PLANNING OF THE POSSIBLE APPROACHES THAT COULD BE PART OF AN INSTITUTE OR EVEN A NATIONAL STRATEGY.

IN THE ASIAN REGION THERE HAS BEEN A RAPID DEVELOPMENT OF THE OPEN UNIVERSITY SYSTEM WHICH ENABLES STUDENTS TO STUDY AT TIMES SUITABLE TO THEM AND IN THEIR OWN ENVIRONMENT. THESE OPEN AND DISTANCE LEARNING (ODL) TECHNIQUES COULD HAVE SPECIFIC BENEFITS FOR THE PROJECT'S SUSTAINABILITY IN THAT THE MATERIALS HAVE TO BE IN A WRITTEN FORM AND MAY BE SUPPORTED BY AUDIO/VISUAL MATERIALS. ADDITIONALLY SINCE THE MATERIALS REQUIRED BY THE TECHNICIAN FOR VOCATIONAL TRAINING, MAY BE OF VALUE AS COMPONENTS IN THE WIDER SYLLABUS FOR SPECIFIC TERTIARY SCIENTIFIC OR ENGINEERING STUDY, THERE COULD BE A USEFUL PROMOTIONAL INPUT BY HAVING THESE MATERIALS PRESENTED TO A WIDER AUDIENCE.

AS AN INITIAL STEP, NATIONAL CO-ORDINATORS WILL BE ASKED TO PROVIDE INFORMATION TO THE IAEA ON THE SPECIFIC TECHNICIAN AND WORKER TRAINING NEEDS IN THEIR COUNTRY. SUBSEQUENTLY, THERE WILL BE EXPERT MISSIONS TO ADVISE ON THE POSSIBILITIES FOR DESIGNING SUITABLE STRATEGIES ONCE THE BACKGROUND INFORMATION HAS BEEN ANALYSED. THERE WILL BE A NEED TO HAVE THESE INITIATIVES IMPLEMENTED AS QUICKLY AS POSSIBLE SINCE THERE WILL BE SIGNIFICANT ADVANTAGES IF A NUMBER OF COUNTRIES CAN REPORT ON THIS MATTERS BY THE TIME OF THE MID-TERM REVIEW MISSION WHICH SHOULD TAKE PLACE IN APRIL 1995. I WOULD ASK YOU TO PLEASE ASSIST WITH THE PROVISION OF INFORMATION AND OPINIONS AS QUICKLY AS POSSIBLE ONCE IT IS REQUESTED. THE PURPOSE OF THIS NOTE IS TO INFORM YOU OF WHAT INFORMATION IS LIKELY TO BE REQUIRED AND WHAT IS EXPECTED TO HAPPEN IN THE NEXT FEW MONTHS. THIS FAX IS BEING COPIED TO ALL NATIONAL CO-ORDINATORS IN THE JOINT UNDP/RCA/IAEA PROJECT FOR THEIR INFORMATION AND I HOPE YOU WILL BE ABLE TO DISCUSS THIS WITH THEM. I WILL BE CONTACTING YOU AGAIN SHORTLY WITH MORE DETAILS. I HOPE THAT THESE NEW ACTIVITIES WILL START IN JANUARY 1995.

MY BEST REGARDS,

John F. Easey, RCA Coordinator

SUBJECT: TECHNICIAN AND WORKER TRAINING.

AS YOU WILL HAVE READ IN MY FAX MESSAGE NUMBER TC874825, I AM TRYING TO GET URGENT FEEDBACK SO THAT WE CAN RAPIDLY RESPOND TO THE ISSUES OF TECHNICIAN AND WORKER TRAINING RAISED AT THE TRIPARTITE REVIEW MEETING FOR THE JOINT UNDP/RCA/IAEA PROJECT HELD ON 24 SEPTEMBER. TO ENABLE THE PLANNING TO PROCEED WOULD YOU PLEASE PROVIDE ME WITH SOME SPECIFIC INFORMATION CONCERNING TECHNICIAN TRAINING AT YOUR INSTITUTE AND, ELSEWHERE IN YOUR COUNTRY, IF YOU HAVE READY ACCESS TO SUCH FACTS.

IN WRITING YUR REPLY, I WOULD LIKE TO HAVE AS MUCH INFORMATION AS POSSIBLE ON THE TOPIC. THERE ARE A FEW SPECIFIC TOPICS LISTED BELOW THAT I WOULD LIKE ANSWERS ON BUT PLEASE FEEL FREE TO INCLUDE ADDITIONAL MATERIALS SO THAT I CAN GET A GOOD BRIEFING ON YOUR SITUATION.

- . DOES YOUR INSTITUTE HAVE A UNIT RESPONSIBLE FOR STAFF TRAINING OR AN OFFICIAL TRAINING OFFICER?
- . DOES YOUR INSTITUTE HAVE FORMAL LINKS TO HIGHER EDUCATION INSTITUTES, UNIVERSITIES AND OPEN LEARNING BODIES IN ANY TRAINING PROGRAMMES YOU CARRY OUT FOR YOUR STAFF?
- . WHERE THERE ARE LINKS WITH OTHER HIGHER EDUCATION INSTITUTIONS, WHAT IS THEIR INPUT INTO THE TRAINING PROGRAMME?
- . IF YOU HAVE NO FORMAL LINKS WITH AN OPEN LEARNING PROVIDER, IS THERE AN OPEN OR DISTANCE LEARNING INSTITUTION IN YOUR COUNTRY THAT YOU COULD WORK WITH?
- . DO YOU HAVE A FORMAL TRAINING PROGRAMME SPECIFICALLY FOR TECHNICIANS WHO ARE WORKING IN YOUR INSTITUTE?
- . WHAT TEACHING RESOURCES DO YOU USE ON YOUR TRAINING PROGRAMMES? ARE THESE PRODUCED BY YOUR OWN STAFF OR ARE THEY BROUGHT IN?
- . CAN THEY GET ANY CERTIFICATION OR OTHER FORMAL RECOGNITION FOR THIS TRAINING?
- . HAS YOUR INSTITUTE OR INDIVIDUAL STAFF MEMBERS BEEN INVOLVED IN THE PREPARATION OF MATERIALS FOR AN OPEN UNIVERSITY PROGRAMME OR SIMILAR DISTANCE LEARNING ORGANIZATION?
- . DOES ANY TRAINING OCCUR IN THE SPECIFIC TECHNOLOGY AREAS COVERED BY THE JOINT UNDP/RCA/IAEA PROJECT?
- . HOW NECESSARY DO YOU THINK A TECHNICIAN TRAINING PROGRAMME IS FOR THE TECHNOLOGIES COVERED BY THE JOINT UNDP/RCA/IAEA PROJECT AND HOW MANY WOULD REQUIRE TRAINING EACH YEAR?
- . COULD SUCH TRAINING BE A UNIT AS PART OF A MORE GENERAL HIGHER EDUCATION COURSE?
- . ARE THERE ANY RECOMMENDED TEXTS OR MANUALS WHICH FORM THE BASIS OF YOUR TRAINING PROGRAMMES?
  - THIS MAY BE REDUNDANT GIVEN YOUR SECOND TO LAST QUESTION. HOWEVER, IT COULD BE USEFUL TO SEE WHICH, IF ANY, DOCUMENTS ARE USED AS THE BASIS OF THEIR TRAINING PROGRAMMES.
- . IS THERE ANY GOVERNMENT POLICY OR REGULATION GOVERNING CONTINUING EDUCATION?

CONCERNING WORKER TRAINING, IT IS REALLY FOCUSSED ON ENSURING THAT THOSE WORKING IN INDUSTRIES USING THE TECHNOLOGIES HAVE ADEQUATE TRAINING TO ALLOW THERE TO BE SAFE UTILIZATION OF THE TECHNOLOGY. CAN YOU PROVIDE ME WITH DETAILS ON THIS TOPIC? AGAIN, I WOULD LIKE AS MUCH BRIEFING AS POSSIBLE TO ENABLE A CLEAR PICTURE OF YOUR SITUATION TO BE OBTAINED. OF SPECIFIC RELEVANCE ARE THE FOLLOWING POINTS:

- . HOW DO THE GOVERNMENT REGULATIONS GOVERNING IONIZING RADIATION APPLY TO INDUSTRIAL INSTALLATIONS? ARE INDIVIDUALS LICENCED?
- . WHO HAS THE RESPONSIBILITY FOR LICENSING AND INSPECTING THESE INSTALLATIONS?
- . IS THERE ANY REGULATION ON WORKER TRAINING?
- . IS THERE CERTIFICATION OF WORKERS DIRECTLY INVOLVED. ARE THEY REQUIRED TO UNDERTAKE RECERTIFICATION TESTS?
- . DOES YOUR INSTITUTE ASSIST IN PRESENTATIONS FOR ANY WORKER TRAINING PROGRAMMES?
- . HAS YOUR INSTITUTE PREPARED MATERIALS FOR YOUR REGULATORS TO ASSIST IN INFORMING AND TRAINING WORKERS IN UNDUSTRIES.
- . WHAT IS YOUR ESTIMATE OF THE CURRENT NEED IN THIS AREA FOR YOUR COUNTRY?

THANK YOU FOR YOUR ASSISTANCE IN THESE TASKS. AT PRESENT WE ARE PLANNING TO HAVE EXPERT MISSIONS TO AT LEAST HALF THE RCA MEMBER STATES IN 1995 AND AT LEAST THREE WILL BE VISITED IN THE FIRST QUARTER OF THE YEAR. I WILL NOTIFY THE INDIVIDUAL COUNTRY'S THAT WILL BE INVOLVED AS EARLY AS POSSIBLE.

MY BEST REGARDS,

John F. Easey, RCA Coordinator

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SUBJECT: JOINT UNDP/RCA/IAEA PROJECT - MODIFIED PROGRAMME FOR 1995.  
FURTHER TO MY FAX OF 8 DECEMBER, I WOULD LIKE TO GIVE YOU THE  
FOLLOWING ADDITIONAL INFORMATION ON CHANGES TO OUR ANTICIPATED  
PROGRAMME FOR THIS PROJECT.

BECAUSE OF THE DECISION BY UNDP HEADQUARTERS TO LIMIT THEIR  
CONTRIBUTION TO USDOLLARS 558,180 FOR 1995 AND TO REFUSE ANY  
REPHASING OF UNSPENT MONEY FROM 1994, THERE IS GOING TO HAVE TO BE A  
MAJOR REVISION OF WHAT CAN BE IMPLEMENTED IN 1995. I HAVE REVIEWED  
THE VARIOUS OPTIONS AND DECIDED ON THE FOLLOWING CHANGES:

AAA) TWO EVENTS, THE NATIONAL CO-ORDINATORS MEETINGS FOR NUCLEAR  
ANALYTICAL TECHNIQUES AND NCS AND TRACERS WILL BE BROUGHT FORWARD TO  
FEBRUARY 1995 SO THAT POSSIBLY THEY CAN BE SUPPORTED BY OBLIGATIONS  
OF THE 1994 FUNDS. I HOPE TO FAX DETAILS OF THESE IN THE NEXT FEW  
DAYS.

BBB) THE 2 REGIONAL TRAINING EVENTS ON NCS IN PAPER WILL BE DEFERRED  
TO LATE 1995 OR 1996. SINCE THERE HAS BEEN LITTLE ACTIVITY FOR  
OUTPUT 1.1 SO FAR, THERE IS NO MERIT IN PUTTING RESOURCES INTO AN  
AREA WHERE IT IS UNCERTAIN THAT THE OUTPUT CAN BE ACHIEVED. IT IS  
IMPERATIVE THAT AS MANY OUTPUTS AS POSSIBLE ARE FULLY MET SO THAT ANY  
EVALUATION CAN CLEARLY CORRELATE THE PROJECT INPUTS AND OUTPUTS.

CCC) THE TWO LONG-TERM EXPERT POSITIONS FOR RADIATION TECHNOLOGY AND  
NCS DUE TO BE IN PLACE MID-YEAR WILL BE DEFERRED TO 1996.

DDD) NO FELLOWSHIPS WILL BE SUPPORTED IN 1995. ALL MEMBER STATES  
HAVE THEIR OWN MANPOWER DEVELOPMENT PROJECTS UNDER THE AGENCY'S TC  
COUNTRY PROGRAMMES WHICH CAN BE USED AS AN ALTERNATIVE SOURCE OF  
FUNDING.

THE IMPLEMENTATION OF THESE FOUR MEASURES WILL BRING THE 1995 BUDGET  
ESTIMATE IN LINE WITH THE AVAILABLE UNDP FUNDS. THERE WILL BE  
REVISION OF SOME SHORT-TERM EXPERT MISSIONS AND NATIONAL TRAINING TO  
ACHIEVE FURTHER EFFICIENCIES IN THE USE OF FUNDS TO HOPEFULLY SUPPORT  
THE DEFERRED ACTIVITIES.

WE WILL CONTINUE TO LOBBY UNDP FOR ADDITIONAL FUNDING AND IT WILL BE  
NECESSARY TO FULLY DISCUSS THE SITUATION AT THE RCA WORKING GROUP

MEETING IN KUALA LUMPUR IN MARCH.

I REGRET ANY INCONVENIENCE THAT THESE CHANGES MIGHT CAUSE BUT THE  
CURRENT CIRCUMSTANCES ARE BEYOND MY CONTROL AND I WOULD ASK FOR YOUR  
CO-OPERATION IN ADJUSTING THE PROGRAMME TO MEET THE NEW FINANCIAL  
SITUATION.

FOR THOSE COUNTRIES THAT HAVE PLEDGED EXTRABUDGETARY CONTRIBUTIONS TO  
RCA, I WOULD LIKE TO RECEIVE, AS A MATTER OF URGENCY, INSTRUCTIONS ON  
WHAT PROJECT(S) YOU WISH TO SUPPORT AND HOW YOU WISH THE MONEY TO BE  
SPENT.

MY BEST WISHES FOR CHRISTMAS AND THE NEW YEAR AND MY THANKS FOR YOUR  
SUPPORT DURING 1994.

| John F. Easey, RCA Coordinator

| NNNNE

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REGIONAL CO-OPERATIVE AGREEMENT  
INTERNATIONAL ATOMIC ENERGY AGENCY



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MID-TERM REVIEW MISSION  
UNITED NATIONS DEVELOPMENT PROGRAMME

THE USE OF ISOTOPES AND RADIATION  
TO STRENGTHEN TECHNOLOGY AND SUPPORT  
ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT

RAS/92/073

26 FEBRUARY — 17 MARCH 1995

CHINA  
VIETNAM  
MALAYSIA  
BANGLADESH

MISSION MEMBERS:  
K. Paul Steinmeyer  
V. K. Iya  
C. Kenneth Beswick



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## **EXECUTIVE SUMMARY**

### **1. INTRODUCTION**

Following a directive to give priority to industrial applications of isotopes and radiation in the RCA Programme, the IAEA sent a 4-person expert mission in 1978 to visit 10 Asian countries, assess their industrial level, and propose a Regional Cooperative Programme in industrial applications, to be supported by UNDP. A project proposal approved by the participating governments was submitted by the IAEA to UNDP. Pending formal approval by UNDP, pre-Project activities were started in 1981, and a Regional Industrial Project, funded by UNDP, IAEA, and the participating countries, commenced in 1982 (RAS-79-061). The first phase of this Project (1982-86) saw the consolidation of the Project through the establishment of infrastructure, demonstration and regional training courses, and national and regional seminars, etc. With the entry of China and Vietnam, and the participation of the two donor countries (Australia and Japan) inter-regional cooperation in the RCA was on a firm footing.

A proposal for a second phase of the Regional Industrial Project received further support from all the participating countries, the IAEA, and UNDP (RAS/86/073). This phase witnessed a growth and intensification of training programmes, of technology transfer in some Sub-Projects, and a preparation for the harmonisation of examinations and certifications. By the end of the Project in 1992, the objectives were largely fulfilled and core groups of experts were formed at the national nuclear research centres to assist industries for technology transfer. The entry of Mongolia, Myanmar and New Zealand (the last as a donor country) further broadened the regional scope of cooperation, bringing to 17 the number of participating countries.

In 1992, a new Project entitled "The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development"—RAS/92/073—was formally approved for the period 1993-1997 by the participating countries, IAEA, and UNDP, and Project activities commenced in 1993. It was specified that a mid-term review be held to evaluate the progress of the Project. A 3-person Mid-Term Review Mission visited 4 countries of the RCA region from 26 February to 16 March 1995: China, Vietnam, Malaysia and

Bangladesh.

In carrying out this review, the Mission recognizes the fact that this Project has been taken up in the Region with UNDP/IAEA assistance since 1981, and that the level of competence and technology transfer achieved in several countries is a result of this continuing cooperation and support. It is therefore often difficult to quantify the exact outputs in each area, obtained during the current Project.

## **2. TERMS OF REFERENCE**

- 2.1 To determine the relevance of the Project and its results to the UNDP priorities for Sustainable Human Development.**
- 2.2 To determine the extent to which each of the outputs has been achieved and the likelihood of the outputs being fully met by the remaining activities listed in the Project document and subsequent reports.**
- 2.3 To assess the appropriateness, extent and timeliness of the activities implemented so far.**
- 2.4 To assess the responsiveness of the Project management to changes in the Project environment.**
- 2.5 To assess the effectiveness of the Project support provided by all parties and Project monitoring.**
- 2.6 To determine the extent to which Project counterparts and their institutions have absorbed the transferred technology and passed the necessary information to the relevant government, industrial or environment agency.**
- 2.7 To determine a) how well the applications of the technology are understood at counterpart institutions, and b) how it is currently used and the anticipated effect of the remaining Project activities on those two areas.**
- 2.8 To determine the extent and the effectiveness of counterpart institutions in supporting national authorities and local industries with information and their plans for the remaining part of the Project.**
- 2.9 To assess the impact of the Project on the total national effort in technology transfer and the plans for the remaining part of the Project.**
- 2.10 To assess what is the current capacity and capability for technical backstopping the technologies and what contribution the remaining activities**

are likely to make to ensuring sustainability.

At the suggestion of the Mission, the following points were included with a view to seek more information on the relevance of the Project and would be taken into consideration during the evaluation.

- 2.11 Assess the level of involvement of the National Nuclear Research Institutes in basic research and other peripheral/theoretical work, compared to its involvement in the hard technology transfer. What types of assistance are provided? Percent of time spent in the field? Effectiveness of the regulatory process?
- 2.12 Assess the status of training across the board: worker-users of the technology, radiation safety technicians, supervisors/managers, workers not directly involved with the technology. Type(s) of training (i.e., hands-on or theoretical)? Frequency? Effectiveness? Are any local people being trained and groomed for positions other than production labor (e.g., radiation safety, equipment testing and repair)? Are there a sufficient number of trained people available in all categories to compensate for attrition? Check on the use and effectiveness of the distance learning techniques mentioned at the Vienna Tripartite Review Meeting, 24 September 1994.
- 2.13 Assess the status of public education efforts.
- 2.14 For NDT technologies, assess the status of personnel qualifications to international standards. Examine re-testing and re-certification requirements. Is there a training/testing progression from Level 1 through Level 3?
- 2.15 Identify regional cooperative efforts (networking) dealing with these technologies.
- 2.16 Evaluate the capabilities of China and Malaysia for manufacturing and exporting these technologies in the region.
- 2.17 Assess the level of assistance provided by IAEA to the National Institutes.

### **3. FINDINGS AND RECOMMENDATIONS**

3.1 The Mission observed that, in a limited way, this Project has contributed to the UNDP Priorities for Sustainable Human Development.

In environmental improvement, the use of tracer technology is vital in studying groundwater pollution, effluent dispersal patterns in surface waters, and to the solution of pollution problems resulting from the operation of fossil-fueled power stations.

In the countries visited, the Mission noted a significant percentage of women employed in scientific activities related to the Project.

Some of the Project activities have given employment opportunities in small and medium sized enterprises as they take advantage of the new technologies available. For example, tens of thousands are employed in the region in the application of NDT for quality control. This can be related directly to previous and present Project activities. (TOR-1)

3.2 The immediate objectives of the Project are well defined in the Project Document. However, the Outputs indicated for each of the five Sub-Projects are too low and the success criteria have been met too easily and the Outputs have already been fulfilled. These outputs do not justify the level of activities indicated in the Project Document. (TOR-2)

3.3 All the technologies, with the exception of the detoxification of flue gases, are appropriate to the needs of the countries in the region. The Mission finds a lack of relevance to country needs in activities related to the detoxification of flue gases. None of the countries in the region appears to be seriously considering the introduction of this advanced technology which is still at the stage of development in industrialized countries. (TOR-3)

3.4 Finding: In general, progress has been rapid in spreading awareness of the technologies throughout the region. Whilst in some areas, management has responded adequately to the changes and reorientated its strategy, in a few areas management has not been able to respond as rapidly as may have been desirable. For example, non-destructive testing is widely used throughout the region as a result of present and previously related Projects. While there are an abundance of trained personnel at Levels 1 and 2, sufficient attention has not been paid to



training at Level 3 or to the certification process. Only a few countries have a national standard for the qualification and certification of NDT personnel conforming to ISO recommendations. (TOR-4)

**Recommendation:** In the countries which have a national standard for the qualification and certification of NDT personnel, short-term Level 3 international experts should participate in the first Level 3 qualification examination under the national standard. This would ensure transparency and be the step needed to enable the national scheme to be self-sustaining. In those countries where a national standard has not yet been introduced, priority should be given to the acceptance of international recommendations and their formal acceptance at the national level.

3.5 **Finding:** Project support has been effective in all countries. The same cannot be said for project monitoring where the mechanism used does not appear to be adequate. (TOR-5)

**Recommendation:** A system of external audit would be more effective and give credibility to project monitoring.

3.6 **Finding:** The Project counterparts and their institutions have ample knowledge of the technologies involved and have passed the necessary information to the relevant agencies. However, the actual transfer of the technologies to commercial reality is still incomplete and may not be fully achieved by the end of this Project. The responsibility to nurture and foster these technologies rests with the national and local counterparts and their institutions. (TOR-6 and 7)

**Recommendation:** In the remaining stages of the Project, emphasis should be given to those specific areas where relatively small inputs would be sufficient to overcome the few remaining obstacles to full implementation of technology transfer.

3.7 **Finding:** Counterpart institutions have been very effective in furnishing the necessary information to national authorities and local industries, and plan to continue to do so for the remaining part of the Project. (TOR-8)

**3.8 Finding:** The impact of this Project on the total national effort in technology transfer has been very limited. There is a reluctance to transfer nuclear technologies to other sectors.

**Recommendation:** These technologies should no longer be the exclusive property of nuclear institutions and should be made available to others so that they may find their rightful place among the competing technologies. (TOR-9)

**3.9 Finding:** Sufficient training has already been given through training courses, workshops and seminars to bring most countries to the level of sustainable technological capability. These countries have taken full advantage of Project inputs and even at this stage are in a position to provide technical backstopping. (TOR-10)

**Recommendation:** In those countries where sustainability is yet to be reached in specific areas, and where critical inputs would enable the programmes to achieve this, selective inputs should be provided without regard to equal distribution of funds.

**3.10 Finding:** The number of meetings for Project/Sub-Project coordination is far in excess of those required to meet the objectives of the Project (Annex 7.5).

**3.11 Finding:** The Mission finds that since an adequate number of personnel are now trained in the majority of the participating countries (with the exception of the recent entrants Mongolia and Myanmar).

**Recommendation:** The number of future regional training courses should be severely reduced.

**3.12 Finding:** Networking is weak. There is little communication between specialists in the region except during meetings of regional counterparts or coordinators, regional training courses, workshops and seminars, an extremely inefficient and costly way of networking.

**Recommendation:** The Mission recommends that a strong effort should be made to increase communication between countries in the region. This would

permit a considerable reduction in the need for regional meetings, thus reducing expenses. The introduction of an electronic mail network would go a long way to resolve this problem.

**3.13 Finding:** The selection of short-term international experts has been generally very good, particularly in the areas of radiation processing, crosslinking and tracers. However, the utilization and selection of long-term experts needs to be re-examined. Some countries have expressed dissatisfaction both with the level of expertise and dedication to the task.

**3.14 Finding:** In spite of assistance provided through the present and previous Projects over a period of 14 years, there is a wide disparity in the levels of technology transfer achieved among countries in the region.

**3.15 Finding:** With the exception of 2 or 3 facilities visited, the need for a comprehensive radiation protection program in some of the countries is apparent. In some cases there appeared to be no routine procedures in place to control entry into potentially very high radiation areas, and no confirmatory radiation surveys were performed prior to entry into such areas.

In some of the centres in China the need to upgrade the level of radiation safety measures is apparent. For instance, it was stated that none of the teletherapy centres has a medical physicist to ensure accurate dose delivery to patients. While the medical use of radiation is outside the scope of this Project, it is brought to the attention of IAEA because of the serious nature of the situation. China also reported that there were few health physicists available to oversee the protection of workers and the public.

In Vietnam, while the number of portable radiation detectors is very small, the level of awareness on their usage was high and in conformity with established health physics practice.

**Recommendation:** An overall upgrading of health physics programs in parallel

with the growth of these nuclear technologies should be a matter of priority in the Project.

**3.16 Finding:** It is common practice to hold training courses in those countries considered to be advanced in the particular sub-project. This arrangement allows for the training of one and sometimes two persons per country, except in the host country which is able to train a larger number of participants. The host country also benefits from the presence of international experts, and from some items of equipment which are donated. This system serves to further strengthen those already advanced countries, leading eventually to a widening of the technological gap within the region.

**Recommendation:** Whenever feasible, training courses should be held in a country which is less advanced but making serious efforts to apply the specific technology, and has the ability to support the training event, so that a larger number of persons in that country could be prepared.

**3.17 Finding:** The Mission could find no evidence of any testing laboratory having been accredited to ISO-25 recommendations.

**Recommendation:** Steps should be taken in all the countries of the region to achieve this since this would give more credibility to test results, increasingly necessary for international commerce. Furthermore, it will also become necessary that processes conform to ISO-9000 for quality assurance and eventually ISO-14,000 for environmental protection.

**3.18 Finding:** The Mission noted that some countries were almost entirely dependent on IAEA technical assistance programmes for equipment and training. This dependancy is not a healthy practice as this assistance should not become a substitute for government support. There is a tendency to look towards the RCA Project as another vehicle for further assistance.

**Recommendation:** IAEA/UNDP assistance should be conditioned by a clear government indication of priority through the commitment of hard funds to the different components of the programme.

## **1. INTRODUCTION**

Following a directive to give priority to industrial applications of isotopes and radiation in the RCA Programme, the IAEA sent a 4-person expert mission in 1978 to visit 10 Asian countries, assess their industrial level, and propose a Regional Cooperative Programme in industrial applications, to be supported by UNDP. A project proposal approved by the participating governments was submitted by the IAEA to UNDP. Pending formal approval by UNDP, pre-Project activities were started in 1981, and a Regional Industrial Project, funded by UNDP, IAEA, and the participating countries, commenced in 1982 (RAS-79-061). The first phase of this Project (1982-86) saw the consolidation of the Project through the establishment of infrastructure, demonstration and regional training courses, and national and regional seminars, etc. With the entry of China and Vietnam, and the participation of the two donor countries (Australia and Japan) inter-regional cooperation in the RCA was on a firm footing.

A proposal for a second phase of the Regional Industrial Project received further support from all the participating countries, the IAEA, and UNDP (RAS/86/073). This phase witnessed a growth and intensification of training programmes, of technology transfer in some Sub-Projects, and a preparation for the harmonisation of examinations and certifications. By the end of the Project in 1992, the objectives were largely fulfilled and core groups of experts were formed at the national nuclear research centres to assist industries for technology transfer. The entry of Mongolia, Myanmar and New Zealand (the last as a donor country) further broadened the regional scope of cooperation, bringing to 17 the number of participating countries.

In 1992, a new Project entitled "The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development"—RAS/92/073—was formally approved for the period 1993-1997 by the participating countries, IAEA, and UNDP, and Project activities commenced in 1993. It was specified that a mid-term review be held to evaluate the progress of the Project.

In carrying out this review, the Mission recognizes the fact that this Project has been taken up in the Region with UNDP/IAEA assistance since 1981, and that the

level of competence and technology transfer achieved in several countries is a result of this continuing cooperation and support. It is therefore often difficult to quantify the exact outputs in each area, obtained during the current Project.

## **2. TERMS OF REFERENCE**

- 2.1 To determine the relevance of the Project and its results to the UNDP priorities for Sustainable Human Development.**
- 2.2 To determine the extent to which each of the outputs has been achieved and the likelihood of the outputs being fully met by the remaining activities listed in the Project document and subsequent reports.**
- 2.3 To assess the appropriateness, extent and timeliness of the activities implemented so far.**
- 2.4 To assess the responsiveness of the Project management to changes in the Project environment.**
- 2.5 To assess the effectiveness of the Project support provided by all parties and Project monitoring.**
- 2.6 To determine the extent to which Project counterparts and their institutions have absorbed the transferred technology and passed the necessary information to the relevant government, industrial or environment agency.**
- 2.7 To determine a) how well the applications of the technology are understood at counterpart institutions, and b) how it is currently used and the anticipated effect of the remaining Project activities on those two areas.**
- 2.8 To determine the extent and the effectiveness of counterpart institutions in supporting national authorities and local industries with information and their plans for the remaining part of the Project.**
- 2.9 To assess the impact of the Project on the total national effort in technology transfer and the plans for the remaining part of the Project.**
- 2.10 To assess what is the current capacity and capability for technical backstopping the technologies and what contribution the remaining activities are likely to make to ensuring sustainability.**

**At the suggestion of the Mission, the following points were included with a view to seek more information on the relevance of the Project and would be taken into**

**consideration during the evaluation.**

- 2.11 Assess the level of involvement of the National Nuclear Research Institutes in basic research and other peripheral/theoretical work, compared to its involvement in the hard technology transfer. What types of assistance are provided? Percent of time spent in the field? Effectiveness of the regulatory process?**
- 2.12 Assess the status of training across the board: worker-users of the technology, radiation safety technicians, supervisors/managers, workers not directly involved with the technology. Type(s) of training (i.e., hands-on or theoretical)? Frequency? Effectiveness? Are any local people being trained and groomed for positions other than production labor (e.g., radiation safety, equipment testing and repair)? Are there a sufficient number of trained people available in all categories to compensate for attrition? Check on the use and effectiveness of the distance learning techniques mentioned at the Vienna Tripartite Review Meeting, 24 September 1994.**
- 2.13 Assess the status of public education efforts.**
- 2.14 For NDT technologies, assess the status of personnel qualifications to international standards. Examine re-testing and re-certification requirements. Is there a training/testing progression from Level 1 through Level 3?**
- 2.15 Identify regional cooperative efforts (networking) dealing with these technologies.**
- 2.16 Evaluate the capabilities of China and Malaysia for manufacturing and exporting these technologies in the region.**
- 2.17 Assess the level of assistance provided by IAEA to the National Institutes.**

### **3. WORK PROGRAMME**

#### **3.1 China**

Meeting at CNEIC, 27 Feb 95

Visit to Beijing Radiation Application Centre, 27 Feb 95

Meeting at Shanghai University, discussion, 28 Feb 95

Meeting at Shanghai University, discussion, 1 Mar 95

Visit Shanghai Xian Feng Electric Manufacturing Works, 1 Mar 95

Visit Shanghai Cable Works, 1 Mar 95

#### **3.2 Vietnam**

Meeting VINATOM Office, 3 Mar 95

Visit Centre for Radiation Protection Techniques, discussions, 3 Mar 95

Visit Hanoi Irradiation Centre, discussion, 3 Mar 95

Visit Hanoi UNDP Representative, discussion, 3 Mar 95

Visit Centre for Nuclear Techniques, Ho Chi Minh City, discussion, 4 Mar 95

Visit Dalat Nuclear Research Institute, discussions, 6-7 Mar 95

#### **3.3 Malaysia**

Meeting at MINT, discussion, 9 Mar 95

Meeting at SIRIM, discussion, 9 Mar 95

Visit MINT Accelerator, 10 Mar 95

Visit MINT Irradiator, 10 Mar 95

Meeting at MINT, discussion, 10 Mar 95

#### **3.4 Bangladesh**

Meeting at Bangladesh Atomic Energy Commission, discussion, 11 Mar 95

Visit Dhaka Atomic Energy Commission Laboratories, discussion, 11 Mar 95

Preparation of Mission Report, 12-13 Mar 95

Visit AERE, Savar, discussion, 14 Mar 95

Final Meeting with BAEC, discussion, 15 Mar 95

Finalisation of Mission Report, 15 Mar 95



#### **4. ACTIVITIES IN COUNTRIES VISITED—Observations and Comments**

##### **4.1 Radiation Processing**

###### **4.1.1 China**

In China, radiation processing has been given the highest priority amongst the five Sub-Projects. China has advanced rapidly in this field since its entry into the RCA in 1985. There are today 50 large cobalt-60 irradiators (maximum capacity 23 MCi, actual loading 6 MCi), and 26 accelerators used for industrial applications.

The Mission had detailed briefings on the radiation processing activities in China, and visited a few industrial and pilot-scale plants in the Beijing and Shanghai regions which use cobalt-60 or electron accelerators (Annex 7.2.1). In addition, they met a large number of specialists (Annex 7.3.1) in the various disciplines of radiation processing. Detailed papers on the work and achievements of China in the field were presented to the Mission (Annex 7.4.1).

Applications using cobalt-60 irradiators: The Beijing Radiation Applications Centre (BRARC), set up in 1987, is a scientific institute of the Beijing Municipality, reporting to the Beijing Academy of Science and Technology. A cobalt-60 irradiator was set up by 1989. This is a fully automatic facility, designed and installed by Sulzer of Switzerland, with a maximum capacity of 1 MCi ( $3.7 \times 10^{16}$  Bq), and a current loading of about 0.5 MCi. This multipurpose plant is being used mainly for medical products sterilization, food preservation, and the radiation treatment of industrial materials like rubber sheeting (vulcanization for increasing mechanical strength), wire and cable insulation (cross-linking for increasing heat resistance and ageing resistance), etc.

The BRARC has also set up an indigenously designed and fabricated cobalt-60 plant, with a maximum capacity of 1 MCi, and commissioned in 1994. The Centre also has three research laboratories in the fields of radiation chemistry, quality control (e.g., dosimetry, microbiology) and radiation physics (e.g., shielding, safety).

The larger BRARC plant earns a current annual revenue of about 3 million yuan, operates for 8000 hours per year, and generates a profit of about 30%.

The Beijing Institute of Nuclear Engineering (BINE) has designed and installed a number of cobalt-60 irradiators in different parts of the country suited for multi-

purpose applications including the sterilization of medical products, food preservation, and the radiation chemical processing of liquid products such as the vulcanization of natural rubber latex. However, the radiation vulcanization of latex has not yet been developed. R&D work on the treatment of sewage sludge is being carried out at different centres. Between 10 to 20 thousand tons of 18 different food and agriculture products (garlic, rice, potatoes, etc.) are being treated by radiation every year in 10 plants in the country, and public acceptance is good. The main application of the gamma irradiators is for the sterilisation of medical products and disposables. The Beijing plant was not operational at the time of the Mission visit. There appears to be a clear need to improve good manufacturing practice (GMP) and good radiation practice (GRP) at the plant.

**Radiation Processing Applications Using Electron Accelerators:** The development of accelerators and their applications for radiation processing is concentrated in facilities and industries in the Shanghai Region. R&D work is being carried out on radiation chemistry aspects at the Shanghai Applied Radiation Institute (SARI), Shanghai University (Jia Ding Campus), and, on the development of accelerator machines at the Xian Feng Electric Manufacturing Works. R&D work on formulation chemistry and formulation technology for radiation cross-linking materials, such as PE, PVC wire and cable insulation, heat-shrinkable material, film, tape, foamed plastic, etc. for curing coatings was carried out for several years, and gave fruitful results by the late eighties. Some optimum formulation and compounding was tried on a production scale at the Shanghai Chemical Industry Works, and the Xing He Radiation Factory was put up to produce the necessary materials for cross-linking and curing. This programme has received strong support from the IAEA through the hosting of training programmes under the RCA Regional Industrial Project on cross-linking in China, reputed international radiation experts have been invited to give lectures and advice. At the same time, some essential equipment has been provided by the IAEA through its Technical Cooperation Programme.

The first Shanghai-made electron accelerator (nominal power 20 kW) was installed and put in operation in 1986 at the Shanghai Cable Works. The

production value of this machine in 1994 was 10 million yuan. However, as the machine still had operational problems and shutdowns, the factory has purchased a 80 kW electron accélérateur which is now being commissioned. Since 1985, 16 accelerators have been locally made for industrial application, and 1 exported to Indonesia. In addition, there are 4 machines (USA), 7 Russian, and 1 Japanese machine, with a total of 928 kW of beam power available for radiation applications in industry. Of the above, 10 machines are located in universities and academic institutes for R&D work (Annex 7.4). Thus, China has benefitted fully from this RCA Sub-Project with technology transfer making a full impact. On account of the long-term nature of this programme, it is difficult, however, to quantify the exact benefits since 1993.

#### 4.1.2 Vietnam

There are 2 centres for radiation technology in Vietnam, one at Hanoi (Institute of Nuclear Science and Technology—INST) and 1 at Dalat (Nuclear Research Institute—NRI). The Hanoi centre operates a 100,000 Ci cobalt-60 irradiation facility (Russian) with 58,000 Ci currently installed. The plant sterilizes peat-based material (for nitrogen fixation), has sterilized about 10,000 tissue grafts, some pharmaceutical raw material, treated about 32 tons of tobacco for disinfection from insects, and several kg of mushrooms.

The plant is of the dry storage type. Originally designed as an irradiator for potatoes and onions, it has a capacity of 10 tons per hour at 100,000 Ci of loading. The conveyor's speed is fixed. Sterilization at 25 kGy is carried out by placing products on a small shelf close to the source. The source has to be lowered into the storage flask and the product rotated manually on the shelf to ensure dose uniformity. The capacity for sterilization is hence very limited. The Mission members were impressed with the way the plant has been utilized and with the tidiness of the operation.

The Dalat centre has a 10,000 Ci cobalt-60 source permitting R&D work. The scientists use this for experimenting with vulcanization of rubber latex. About 500 kg have been irradiated. Work on the development of biomedical polymers is also carried out.

The Centre for Nuclear Technologies (CNT) in Ho Chi Minh City plans to set up a large gamma irradiation facility for the sterilisation of medical products with funding partially from the IAEA, partially from the government, and the balance from private industry. IAEA funding through its Technical Cooperation Programme for the years 1996-97 has been approved.

#### 4.1.3 Malaysia

The radiation processing facilities in Malaysia comprise the following:

Type (Mfr.)	Maximum Capacity (MCi or MeV/mA)	Current Loading (MCi)	Owner	Remarks
Gamma Plant (Nordion)	4	2	Ansell, Melaka, 1977	Surgical Gloves
Gamma Plant (Nordion)	2	1.3	MINT, Bangi, 1989	Mainly gloves
Gamma Plant (Nordion)	8	2	Uniphoenix, Rawang, 1994	Surgical gloves
Gamma Cell (Nordion)	0.02	0.0015	UKM, Bangi	R&D
Gamma Cell (BARC-Bombay)	0.01	0.002	MINT, Bangi	R&D
E-Beam Accel (Nissin-Japan)	3/30	n/a	MINT, Bangi, 1991	Cross-linking
E-Beam Accel (Nissin-Japan)	0.9/120	n/a	Sumitano Interconnect Products, Joho Baru, 1994	Cross-linking

The EB machine at MINT is to be used for demonstrating cross-linking applications and sterilization of medical products. Work on the installation of suitable conveyors/drums as under-beam facilities to enable both cross-linking

applications as well as sterilisation work is nearing completion.

Since the time the cobalt-60 irradiator was acquired by MINT, a new gamma radiation plant has been set up by Uni Phoenix; the MINT plant is being used for 50% of its current capacity.

The Radiation Technology group has 26 permanent staff and 28 others on contract. Apart from obtaining funds from its own government, this group has received US\$169,350 from the IAEA (1991-1994), and bilateral assistance from Japan to the extent of US\$4 million (1989-1994). In terms of hardware, the facilities are modern, versatile, and well planned.

The group is engaged in a wide range of R&D activities including the vulcanisation of natural rubber latex, the development of formulations for EB cross-linking of wire and cable insulation and of heat-shrinkable materials, the development of radiation-compatible polypropylene and PVC, etc. Some of the R&D programmes are carried out in collaboration with industry, or under bilateral cooperation with Japan. This group has been involved in a large number of national and regional seminars and workshops sponsored both under the RCA Project and under bilateral cooperation with Japan.

#### 4.1.4 Bangladesh

There are two radiation facilities in Bangladesh. Gamma Tech, a cobalt-60 radiation plant (current loading about 60 kCi), is a dry storage facility set up at Chittagong with IAEA assistance, and has been mainly used for pilot-scale irradiation of sea foods. Another old gamma radiation facility, located at Savar, Institute of Food and Radiation Biology, has a current source strength of about 20 kCi (Annex 7.4.4) and is being well used for feasibility studies. For example, good work in the production and sterilization of tissue has enabled the treatment of 400 burn patients.

A group of qualified scientists work on various R&D programmes, using the gamma facility mentioned above. Areas of R&D work include: modification of polymers, wood and bamboo plastic composites, upgrading of jute, etc. After the processes are fully developed, the group proposes to set up pilot plant facilities, subject to the availability of funds. Apart from IAEA funding, the radiation

technology group has collaborative programmes with Cranfield University (UK) and with Memphis State University (USA).

## **4.2 Non-Destructive Testing (NDT)**

### **4.2.1 China**

In 1978, the Non-Destructive Testing Institution (NDTI) was founded. It is affiliated with the Chinese Mechanical Engineering Society (CMES), and there are now more than 20 provinces and municipalities which have local NDTI's,

As a result, and based on international experience, 50,000 NDT personnel have been trained and qualified by NDTI and in specific industrial sectors at all levels. A total of more than 100,000 certificates have been issued. In addition, NDT training is given up to the doctorate level in 26 universities, colleges and scientific institutions, and courses are given routinely in special technical and secondary schools.

There have been 5 national NDT conferences and more than 5,000 papers have been published. Training, technical manuals and books are widely available and over 300,000 copies of NDT journals have been published and distributed.

A wide range of NDT equipment is produced to cover national requirements for the 5 basic techniques, and applied research in the more advanced techniques is sufficiently widespread and coordinated to permit their usage as required.

This broad and coordinated programme has led to a situation where China is completely self-sufficient in NDT technology, the only exception perhaps being in the nuclear power industry where special and innovative practices are needed (Annex 7.4.1).

### **4.2.2 Vietnam**

Since Vietnam joined the activities of this Sub-Project in 1989, there has been a considerable increase in NDT applications as local staff take full advantage of the training received. Starting in Ho Chi Minh City and later in Hanoi, 100 persons have been trained in the basic techniques at Levels 1 and 2 (35 at Level 2).

There are three main NDT centres: the Centre for Nuclear Techniques in Ho Chi

Minh City, the Institute for Nuclear Science and Technology in Hanoi, and the Polytechnic University of Hanoi. Services are provided using the 5 basic techniques, mainly for welds, castings and bridge inspections.

Since 1993, the demand for services has increased considerably, especially in Ho Chi Minh City where there were an average of more than 30 jobs per month in 1994. This is expected to increase to a total of more than 500 jobs in 1995. Nine persons make up the group giving this service, mainly for the control of steel pipes in refineries by radiography. Since only one x-ray machine and one cesium-137 source are available, this is a remarkable achievement.

There have been no reported exposure incidents (Annex 7.4.2).

#### 4.2.3 Malaysia

To coordinate the national effort, the Malaysian Institute for Nuclear Technology (MINT), the Standards and Industrial Research Institute of Malaysia (SIRIM), the National Vocational Training Council (NVTC) and the Atomic Energy Licensing Board (AELB) have been given official responsibility.

There are around 1,000 NDT operators in the country, and of the 35 to 40 private companies which offer NDT services, some 12 are active—2 international and 10 local.

There is still no national standard for the qualification and certification of NDT personnel following ISO-9712, although this is expected to be approved in 1995. Some 600 persons have been given certificates under the present scheme, almost 80 percent of these at Level 1. The failure rate in certification examinations is about 50 percent. There are no locally certified Level 3 personnel but several ASNT Level 3's work in local companies.

In December 1989, the Malaysian NDT Society was formed and now has 200 individual and 40 corporate members. The President of the Society is the Managing Director of SIRIM and the Vice-President is the Project Coordinator for NDT.

In the 5 basic techniques, Malaysia is stated to be 95 percent self-sufficient. This is evidenced by the NDT inspections of long gas pipelines, where several years ago only 50 percent of the work was done by local personnel, and recently 95

percent was local content. There is little experience with other NDT techniques.

As a result of this coordinated effort there is little more that the Project could do to accelerate NDT usage as the expertise is there and promotional campaigns assure that industry is fully aware of the possibilities offered. Assistance in certifying the first Level 3's under the national scheme would give a boost and credibility to the certification scheme. This could be done by the presence of, say, two internationally recognized Level 3's in the certification body's first Level 3 examinations.

#### **4.2.4 Bangladesh**

IAEA technical cooperation and Project participation have been significant factors in the increase in NDT awareness and usage in Bangladesh. The technology is centred in the Bangladesh Atomic Energy Commission (BAEC) which has been the focal point in acquiring the competence and experience to provide services to industry and the public sector and in training operators in the 5 basic techniques.

With the approval of the government, an NDT Personnel Certification Committee and an NDT Academic Committee have been set up to formalize compliance with international norms. There have been 14 national training courses so far and more than 150 persons have been prepared at Levels 1 and 2 in the range of the basic techniques. Five persons have received training at Level 3 through the Project.

There is still no national standard for the qualification and certification of NDT personnel but the Bangladesh Society for Non-Destructive Testing (BSNDT), which was formed in 1991, is pressing for acceptance of ISO-9712.

BAEC has provided inspection services to 44 industrial organizations. Other state organizations in the chemical, steel, oil, railway and airline sectors now have in-house capabilities in NDT and there are some private NDT service companies.

Bangladesh is close to achieving self-reliance in the basic NDT technologies and further assistance to certificate the first Level 3's through examination would consolidate this (Annex 7.4.4).



### **4.3 Tracers**

#### **4.3.1 China**

With 6 research reactors and a cyclotron available, China is able to produce all the tracers it may require for industrial applications. The use of tracers in the oil and petroleum industry is widespread as one would have anticipated, given the infrastructure, the trained manpower, and the industrial activity. Some chemical industries, however, sometimes hesitate to use tracers on account of the radioactivity.

The tracer group of INST Beijing offers a tracer service to industry for troubleshooting: a) Tracers have been used in China to study pollution in groundwater; b) A radiotracer study of sediment transport in Shanghai harbor has been carried out with Australian cooperation; c) Five Chinese experts went to Sri Lanka to demonstrate and train personnel in the use of tracers for locating leaks in buried pipelines. Chinese scientists have benefitted from participation in two training courses held in Bombay under the Sub-Project; this Sub-Project has clearly enhanced regional cooperation in economically and environmentally beneficial terms (Annex 7.4.1).

#### **4.3.2 Vietnam**

There are two tracer groups, one at the NRI Dalat, and one at CNT in Ho Chi Minh City. The Dalat tracer group carried out a study of the bedload transport at Haiphong Harbor using scandium-46-labelled sand. Three field experiments using 5 Ci of scandium-46 were carried out. The scandium-46 was produced in the Dalat reactor. The IAEA provided an expert for these studies.

The CNT group have carried out studies on a) the measurement of moisture movement by isotope tagging to assess the groundwater recharge in two unsaturated soil zones; b) determination of movement rate of underground water by the single well method; c) dam leakage study at the water reservoirs of 2 hydro-electric power stations.

In all the above studies, the isotopes were produced in the 500 kW Dalat reactor (Annex 7.4.2).

#### **4.3.3 Malaysia**

The MINT produces radioisotope tracers in its TRIGA-II reactor in Bangi. There are 8 scientists in the tracer group. Many of these have been trained through the RCA regional training courses and in ANSTO Australia through bilateral cooperation. Tracer technology has been applied in the areas of groundwater contamination, pollution studies, for the study of process parameters in a sewage treatment plant, and sediment transport, etc. Efforts to develop the different equipment used in tracer work are underway. There is considerable interest in using isotope sources for scanning distillation columns (Annex 7.4.3).

#### **4.3.4 Bangladesh**

Thanks to its 3 MW TRIGA Mark II reactor, Bangladesh is able to produce isotopes useful as tracers. The Bangladesh Atomic Energy Commission has a significant number of trained manpower in all the branches of radioisotope applications coming under the RCA regional Project. Regional training courses in the RCA have been useful for training scientists in this Sub-Project. The equipment needed for tracer applications is available, obtained through IAEA technical assistance (Annex 7.4.4).

However, there seems to be some hesitation in carrying out field experiments independently using radioisotopes in industry and hydrology. With expert assistance available from IAEA, sediment transport studies have been done in Chittagong harbour in 1990. A report of this study was submitted to the harbour authorities in 1992.

### **4.4 Nucleonic Control Systems**

#### **4.4.1 China**

The development of nucleonic control systems started in 1979 and there are presently more than 60 NCS manufacturers producing over 40 types of products, most of which use state-of-the-art electronics with Chinese-language software programmes.

There are presently about 10,000 gauging systems installed in the paper, iron and steel, mineral, cement, petroleum, chemical, textile and glass industries, for

example, and their use is widespread in civil engineering.

It is admitted, however, that the quality of domestic products does not always compare well with internationally available systems, and that local production cannot satisfy industrial demands. It is expected that joint ventures with foreign companies will raise the quality and reliability of products to meet national requirements, although this may not happen in the immediate future.

Nevertheless, there are more than 1,000 cement factories using thousands of level gauges and some X-ray analytical systems; about 180 gauges are used in the paper industry; almost 400 gauges of different kinds in the iron and steel industry. Analytical systems do not appear to have been widely developed as yet, although an XRF gauge for gold analysis is enjoying success.

The further exploitation of this technology will depend more on the upgrading of the electronics and metal-mechanical industries than on inputs from the RCA/IAEA Project (Annex 7.4.1).

#### 4.4.2 Vietnam

Vietnamese industry is still not able to take full advantage of nucleonic control systems, but this situation could change because of the rapidly advancing industrialization programme.

Staff in Hanoi, Ho Chi Minh City and Dalat have received training and are well placed to give advice to industry on specific applications. They have repaired, renovated and helped in the installation of NCS systems in the cement, paper and brewery industries (Annex 7.4.2).

#### 4.4.3 Malaysia

There is little demand in Malaysia for nucleonic control systems since the scale of industry does not warrant the investment required.

Staff of MINT have adequate adequate training to allow them to act in an advisory capacity to industry, and as a result of Project activities the number of nucleonic gauges is increasing—five in the pulp and paper industry and six in the mineral industry.

In relation to demand, this area of application is covered by training received

through Project and Technical Cooperation activities (Annex 7.4.3).

#### **4.4.4 Bangladesh**

This technology is in its infancy in Bangladesh and no industrial installations were identified. Staff at BAEC are aware of the theory and potential of industrial gauging systems and are prepared to assist and advise industry in the evaluation and installation of such systems (Annex 7.4.4).

### **4.5 Nuclear Analytical Techniques**

#### **4.5.1 China**

Since the early 1970's, China has taken up the development and application of a range of nuclear analytical techniques for application to biological, environmental, material and archaeological sciences. The development and supply of miniature neutron source reactors to several institutions catalysed the use of activation analysis in China. By 1955, more than 50 institutions, including 20 major facilities, are engaged in research and applications of nuclear analytical techniques throughout China (Annex 7.4.1). These techniques include neutron activation analysis (NAA), particle-induced x-ray emission (PIXE), scanning proton microscope (SPM), accelerator mass spectroscopy (AMS), Mossbauer spectroscopy, etc.

This programme has not depended upon nor drawn much from the Sub-Project activity. However, China's advances in this field, particularly in the applications for environmental sciences, are useful to other RCA countries through academic exchanges in regional coordinated programmes (RCP's), training courses and workshops.

#### **4.5.2 Vietnam**

There are two leading centres for NAT in Vietnam, one at the NRI Dalat, the other at INST Hanoi. The Hanoi laboratory is well equipped, having an alpha spectrometer, track detector, low background gamma spectrometer and beta counter, etc., permitting the analysis of environmental, soil and food samples, and the measurement of radon.

The Dalat laboratories carry out NAA, prompt gamma NAA, radiochemical NAA,

XRFA, and other techniques for environmental, soil and food sample analysis. Two air sampling stations have been established in Dalat and Ho Chi Minh City for air pollution monitoring, and Vietnam sent two participants to the workshop in NAT held at Bombay in January 1994.

This Sub-Project, still in its early stages of implementation, has been useful to Vietnam. The training has clearly benefitted the scientists and will increase the country's capability to achieve sustainable environmental development (Annex 7.4.2).

#### **4.5.3 Malaysia**

MINT has plans to develop and set up the infrastructure in the field of nuclear analytical techniques. A group of scientists is involved in this task, and training opportunities are being utilised as they arise (Annex 7.4.3).

#### **4.5.4 Bangladesh**

A wide range of equipment, obtained mainly through IAEA technical assistance, has been set up for nuclear analytical techniques. A group of well trained scientists is currently using these techniques (NAA, PIXE, ED-XRF, TXRF, etc.) for a range of applications including monitoring of pollutants in air, surface and ground water, industrial effluents, etc.

The RCA Sub-Project has been useful in the training and academic exchange opportunities offered for manpower development (Annex 7.4.4).

### **5. ACTIVITIES IN COUNTRIES NOT VISITED**

#### **5.1 India**

Radiation technology using cobalt-60 irradiators has taken strong roots in the country, with the first radiation plant (Isomed) set up at Bombay for medical products sterilization with UNDP assistance as early as 1974. Two other commercial plants, locally designed and fabricated, are operating at Delhi and Bangalore. A demonstration plant for radiation vulcanization of natural rubber latex is operating at Kerala, and a pilot plant for the treatment of sewage sludge operates at Baroda. A multi-purpose irradiator at Jodhpur is mainly concerned with

food irradiation. Several entrepreneurs are considering setting up radiation plants for treating spices and other food products.

NDT training in India is mainly covered by BARC or the Indian Society of Non-Destructive Testing (ISNT) which conducts several courses throughout the country. These courses for Levels 1, 2 and 3 conform to ISO standards and are conducted at a number of academic and industrial institutions besides BARC. Every year about 150 candidates are trained.

Taking into account the strong infrastructure and the level of activities in the different Sub-Projects in the country, a number of regional workshops, regional, national and international conferences and seminars have been organised in the last 2 years or will take place shortly. The subjects of these activities include environmental and industrial applications of nuclear analytical techniques (RCA Workshop), applications of radioisotopes and radiation in industrial development (International Conference—National Association for Applications of Radioisotopes and Radiation, February '94, National Conference on Industrial Applications, February '95), 14th World Conference on NDT (December '96). Details of the training programmes, of distant education, and activities for creation of awareness are listed in the documents submitted (Annex 7.5.1).

The Indian document recommends that in view of the fact that a significant amount of training takes place in specific areas covered by the joint UNDP/RCA/IAEA Project, no fresh training programmes may be necessary in the immediate future.

## **5.2 Indonesia**

The country document does not give any significant information on current activities, and expresses satisfaction with the implementation of the Project. It recommends that future programmes should be strongly related to the establishment of regulation, certification and good maintenance and operation of irradiation facilities as well as intercomparison activities (Annex 7.5.2).

## **5.3 Korea**

Korea has achieved considerable success in the field of medical products

sterilization and radiation cross-linking of wire and cable, through the assistance of this UNDP Project. The RCA Programme has been an effective vehicle for technology transfer to local industry.

Korea has no RCA activity in the field of tracers and nucleonic control systems. A number of NDT activities for manpower development have taken place as part of the RCA Project. These include training courses, workshops, seminars and expert visits. The Korean country statement (Annex 7.5.3) indicates that Korea has achieved self-reliance in the NDT field.

#### **5.4 Pakistan**

Pakistan has a commercial radiation sterilization plant in operation at Lahore, but the construction and operation of this plant pre-dates the current Project.

Services in NDT are provided by PAEC, although no details are given in the report. Likewise, no activities are reported in tracer technology or in NAT. No specifics are reported in the area of NCS, although appropriately qualified persons from the paper industry have benefitted from training in the RCA seminars and workshops. While Pakistan reports sponsoring a number of non-technical management seminars and attendance at a variety of training courses, no other concrete progress in new technology transfer was reported (Annex 7.5.4).

#### **5.5 Philippines**

5.5.1 The Philippines Nuclear Research Institute (PNRI) has made good use of its pilot radiation technology facility and regional and national training events to reach a level of competence which serves as a solid base for providing the know-how and backup to industries which are now considering the commercialization of this technology.

There is an apparent need for a commercial-scale radiation sterilization plant with private industry seriously considering such a venture. The contractual services given by PNRI have served to demonstrate the viability of this. Cooperation with other industrial sectors, such as rubber and latex, should enable these industries to evaluate the appropriateness of radiation technology to their needs.

It appears that considerable emphasis has been given to the emerging technology

of electron beam (EB) treatment of flue gases in bringing developments in this field to the attention of industry and government.

PNRI has the expertise necessary to assist industry to take advantage of almost all aspects of radiation technology (Annex 7.5.5).

5.5.2 With valuable assistance from the Project, the use of non-destructive testing (NDT) in the country is very well established. Inputs through PNRI have been transmitted to industry and the techniques are widely and appropriately used.

The Philippines Society for Non-Destructive Testing (PSNT) follows international guidelines in the certification of all levels of NDT personnel and, together with PNRI, gives numerous training courses. Industry and government regulatory agencies accept the need for and usefulness of NDT inspection and the techniques appear to be in widespread use.

The project would seem to have achieved its objectives in having assisted the country to reach a level of expertise and autonomy which the existing infrastructure should be able to sustain and spread to cover national needs.

Further regional cooperation, particularly in the preparation and collection of test pieces, would be an added refinement to ensure that the technology maintains its momentum.

5.5.3 Two tracer tests are reported and technical personnel from other organizations have been prepared through a Project training course to enable them to participate in water movement studies.

Activities appear to be mainly directed at informing local industries and government bodies of the effectiveness of tracer techniques through seminars, expert missions and workshops.

The group "has received sufficient training and has been exposed to a wide range of practical work during the industrial phases of the Project so that they have the capability of producing viable groups for the future."

5.5.4 The number of nucleonic gauges in industry increased from 340 in 1991 to 444 at the end of 1994. Although the National Coordinator states the need to



establish stronger links with industry, it is stated that the group "has acquired sufficient training and experience to become viable for providing services to industry."

5.5.5 The Project has had very little impact so far on the use of NAT, although the techniques are relevant to priorities to acquire reliable environmental data. Very little has been accomplished in terms of actual measurements, but equipment will be provided through IAEA technical cooperation in 1995 and 1996 (Annex 7.5.5).

## **5.6 Sri Lanka**

5.6.1 Sri Lanka plans to introduce radiation vulcanisation of natural rubber latex (RVNRL) on a commercial basis at some future time. A national executive management seminar (NEMS) was conducted in 1994, and a national training course (NTC) on radiation chemistry will be organised in 1995.

Sri Lanka admits, however, that they are not likely to make significant progress on the sterilisation of medical products, or on the treatment of flue gas, sewage sludge, or municipal waste water under this RCA Project.

5.6.2 Under the NDT Sub-Project a Level 3 qualifying examination on radiographic testing was conducted, and 6 persons qualified. Level 3 qualifying examinations in other areas of NDT will be conducted periodically. National training programmes in Level 1 and 2 will be conducted. As a result of this Programme the number of national institutes using NDT has increased significantly (Annex 7.5.6).

5.6.3 During 1993 and 1994, three scientists received training in process optimization using radiotracers. The National Cement Corporation is planning to investigate the feasibility of using nuclear tracers in process optimization. One engineer attended the workshop in Malaysia on the dispersion of effluents in water. Two expert missions were completed on the study of leachate propagation and the efficiency of sea outfalls. A study is planned on leaching of waste water from a municipal waste disposal site to a river which is a drinking water source. A national seminar was conducted on the application of tracer technology to coastal

engineering. Action is being taken as a result of this seminar to utilize tracer technology to solve the problems which the seminar identified (Annex 7.5.6).

5.6.4 A demonstration on gamma scanning of a distillation column at Ceylon Petroleum Corporation (CPC) was carried out in 1994. As a result of this demonstration, CPC engineers are now able to use nuclear gauges for routine preventive maintenance. Similar (unspecified) activities are expected in 1995 and 1996.

5.6.5 A national committee on NAT has been formed for the harmonization of analytical procedures within the region.

## **6. FINDINGS AND RECOMMENDATIONS**

6.1 The Mission observed that, in a limited way, this Project has contributed to the UNDP Priorities for Sustainable Human Development.

In environmental improvement, the use of tracer technology is vital in studying groundwater pollution, effluent dispersal patterns in surface waters, and to the solution of pollution problems resulting from the operation of fossil-fueled power stations.

In the countries visited, the Mission noted a significant percentage of women employed in scientific activities related to the Project.

Some of the Project activities have given employment opportunities in small and medium sized enterprises as they take advantage of the new technologies available. For example, tens of thousands are employed in the region in the application of NDT for quality control. This can be related directly to previous and present Project activities. (TOR-1)

6.2 The immediate objectives of the Project are well defined in the Project Document. However, the Outputs indicated for each of the five Sub-Projects are too low and the success criteria have been met too easily and the Outputs have already been fulfilled. These outputs do not justify the level of activities indicated in the Project Document. (TOR-2)

6.3 All the technologies, with the exception of the detoxification of flue gases, are appropriate to the needs of the countries in the region. The Mission finds a lack of relevance to country needs in activities related to the detoxification of flue gases. None of the countries in the region appears to be seriously considering the introduction of this advanced technology which is still at the stage of development in industrialized countries. (TOR-3)

6.4 **Finding:** In general, progress has been rapid in spreading awareness of the technologies throughout the region. Whilst in some areas, management has responded adequately to the changes and reorientated its strategy, in a few areas management has not been able to respond as rapidly as may have been desirable. For example, non-destructive testing is widely used throughout the region as a result of present and previously related Projects. While there are an abundance of trained personnel at Levels 1 and 2, sufficient attention has not been paid to training at Level 3 or to the certification process. Only a few countries have a national standard for the qualification and certification of NDT personnel conforming to ISO recommendations. (TOR-4)

**Recommendation:** In the countries which have a national standard for the qualification and certification of NDT personnel, short-term Level 3 international experts should participate in the first Level 3 qualification examination under the national standard. This would ensure transparency and be the step needed to enable the national scheme to be self-sustaining. In those countries where a national standard has not yet been introduced, priority should be given to the acceptance of international recommendations and their formal acceptance at the national level.

6.5 **Finding:** Project support has been effective in all countries. The same cannot be said for project monitoring where the mechanism used does not appear to be adequate. (TOR-5)

**Recommendation:** A system of external audit would be more effective and give credibility to project monitoring.

6.6 Finding: The Project counterparts and their institutions have ample knowledge of the technologies involved and have passed the necessary information to the relevant agencies. However, the actual transfer of the technologies to commercial reality is still incomplete and may not be fully achieved by the end of this Project. The responsibility to nurture and foster these technologies rests with the national and local counterparts and their institutions. (TOR-6 and 7)

**Recommendation**: In the remaining stages of the Project, emphasis should be given to those specific areas where relatively small inputs would be sufficient to overcome the few remaining obstacles to full implementation of technology transfer.

6.7 Finding: Counterpart institutions have been very effective in furnishing the necessary information to national authorities and local industries, and plan to continue to do so for the remaining part of the Project. (TOR-8)

6.8 Finding: The impact of this Project on the total national effort in technology transfer has been very limited. There is a reluctance to transfer nuclear technologies to other sectors.

**Recommendation**: These technologies should no longer be the exclusive property of nuclear institutions and should be made available to others so that they may find their rightful place among the competing technologies. (TOR-9)

6.9 Finding: Sufficient training has already been given through training courses, workshops and seminars to bring most countries to the level of sustainable technological capability. These countries have taken full advantage of Project inputs and even at this stage are in a position to provide technical backstopping. (TOR-10)

**Recommendation**: In those countries where sustainability is yet to be reached in specific areas, and where critical inputs would enable the programmes to achieve this, selective inputs should be provided without regard to equal distribution of funds.

6.10 **Finding:** The number of meetings for Project/Sub-Project coordination is far in excess of those required to meet the objectives of the Project (Annex 7.5).

6.11 **Finding:** The Mission finds that since an adequate number of personnel are now trained in the majority of the participating countries (with the exception of the recent entrants Mongolia and Myanmar).

**Recommendation:** The number of future regional training courses should be severely reduced.

6.12 **Finding:** Networking is weak. There is little communication between specialists in the region except during meetings of regional counterparts or coordinators, regional training courses, workshops and seminars, an extremely inefficient and costly way of networking.

**Recommendation:** The Mission recommends that a strong effort should be made to increase communication between countries in the region. This would permit a considerable reduction in the need for regional meetings, thus reducing expenses. The introduction of an electronic mail network would go a long way to resolve this problem.

6.13 **Finding:** The selection of short-term international experts has been generally very good, particularly in the areas of radiation processing, crosslinking and tracers. However, the utilization and selection of long-term experts needs to be re-examined. Some countries have expressed dissatisfaction both with the level of expertise and dedication to the task.

6.14 **Finding:** In spite of assistance provided through the present and previous Projects over a period of 14 years, there is a wide disparity in the levels of technology transfer achieved among countries in the region.

6.15 **Finding:** With the exception of 2 or 3 facilities visited, the need for a comprehensive radiation protection program in some of the countries is apparent. In some cases there appeared to be no routine procedures in place to control entry

into potentially very high radiation areas, and no confirmatory radiation surveys were performed prior to entry into such areas.

In some of the centres in China the need to upgrade the level of radiation safety measures is apparent. For instance, it was stated that none of the teletherapy centres has a medical physicist to ensure accurate dose delivery to patients. While the medical use of radiation is outside the scope of this Project, it is brought to the attention of IAEA because of the serious nature of the situation. China also reported that there were few health physicists available to oversee the protection of workers and the public.

In Vietnam, while the number of portable radiation detectors is very small, the level of awareness on their usage was high and in conformity with established health physics practice.

**Recommendation:** An overall upgrading of health physics programs in parallel with the growth of these nuclear technologies should be a matter of priority in the Project.

6.16 **Finding:** It is common practice to hold training courses in those countries considered to be advanced in the particular sub-project. This arrangement allows for the training of one and sometimes two persons per country, except in the host country which is able to train a larger number of participants. The host country also benefits from the presence of international experts, and from some items of equipment which are donated. This system serves to further strengthen those already advanced countries, leading eventually to a widening of the technological gap within the region.

**Recommendation:** Whenever feasible, training courses should be held in a country which is less advanced but making serious efforts to apply the specific technology, and has the ability to support the training event, so that a larger number of persons in that country could be prepared.

6.17 **Finding:** The Mission could find no evidence of any testing laboratory having been accredited to ISO-25 recommendations.

**Recommendation:** Steps should be taken in all the countries of the region to

achieve this since this would give more credibility to test results, increasingly necessary for international commerce. Furthermore, it will also become necessary that processes conform to ISO-9000 for quality assurance and eventually ISO-14,000 for environmental protection.

6.18 Finding: The Mission noted that some countries were almost entirely dependent on IAEA technical assistance programmes for equipment and training. This dependency is not a healthy practice as this assistance should not become a substitute for government support. There is a tendency to look towards the RCA Project as another vehicle for further assistance.

Recommendation: IAEA/UNDP assistance should be conditioned by a clear government indication of priority through the commitment of hard funds to the different components of the programme.

**7. LIST OF ANNEXES**

**7.1 Institutions Visited**

**7.2 Persons Contacted**

**7.3 Country Statements**

**7.4 Reports From Countries Not Visited**

**7.5 Work Plan for 1994-1995**



**ANNEX 7.1**  
**Institutions Visited**

**7.1.1 China**

CNEIC

Beijing Radiation Application Centre

Shanghai University

Shanghai University

Shanghai Xian Feng Electric Manufacturing Works

Shanghai Cable Works

**7.1.2 Vietnam**

VINATOM Office

Centre for Radiation Protection Techniques

Hanoi Irradiation Centre

Hanoi UNDP Representative

Centre for Nuclear Techniques, Ho Chi Minh City

Dalat Nuclear Research Institute

**7.1.3 Malaysia**

MINT

SIRIM

MINT Accelerator

MINT Irradiator

**7.1.4 Bangladesh**

Bangladesh Atomic Energy Commission

Dhaka Atomic Energy Commission Laboratories

AERE, Savar

**ANNEX 7.2**  
**Persons Contacted**

#### NOTES ON THE MID-TERM REVIEW FOR RAS/92/073

The Mid Term Review Mission for RAS/92/073 carried out between 26 February and 17 March 1995 has delivered its report based on visits to China, Vietnam, Malaysia and Bangladesh. The document will be studied by Member States with interest. The technical credentials of the team were extremely high and their independent assesment will be very valuable.

There is one expect however, where the team's "Finding and Recommendations" will have to be viewed with caution. There is necessity for the project to be implemented in accordance within the Articles of the Regional Cooperative Agreement, the rules and regulations of the IAEA and the conditions imposed by the extrabudgetary donors. Some individual management modalities are there to provide the necessary checks, balances and transparency required for the overall efficient working of the programme. Unfortunately, the Review Mission have not appreciated some of this aspects.

The following amplifications are made on the individual comments listed under "Findings and Recommendations".

- 3.1 Other examples could be given but there may be some consideration of balance of the text to limit the citations.
- 3.2 The Project Document was the product of a number of meetings of regional experts. Under the Agreement there is no mechanism to exclude any Member State from participation in any RCA project, infact Article IV specifically states that any Government Party may participate. In the design of the project, it was noted that all RCA Member States wished to take part, eventhough some had strong technical ability in specific areas. With the range of experience and most of the sub project areas varying from almost nothing to high level through the region, the view was taken that the outputs should be set to enable the lowest developed Member States to attain the minimum acceptable level of training and the others should be able to use the additional contribution to the development of their skills, knowledge and experience to build up the necessary preconditions for sustainability. As detailed in the Terminal Report for the UNPD funded "Industrial Project" RAS/86/073 there were few areas where sustainability had been achieved with this "top up" was required to secure the investment made in that project and the present one.

For example:-

Tracer Technology p37 and 38

".....the viability of the National Tracer Groups (NTGs) has not been able to achieved in some countries....."

"NTGs in Indonesia, Malaysia, Pakistan and the Phillipines should have sufficient infrastructure to become viable for providing services to industry either now or in future years; Republic of Korea and Thailand are developing sustainability for NTGs; Bangladesh is beginning to develop the NTGs skills; and Sri Lanka and Vietnam are developing infrastructure to establish working NTGs"

"Only four out of nine NTGs have been able to provide limited field services to industry using national resources."

Excluding India and China, there are no self sufficient countries but the region is self sufficient at the end of the project.

Non - Destructive Testing p38 and 41

"At the end of the project.....three countries.....should be able to undertake all but very unusual or specialized NDT applications and to carry out all training with indigenous resources"

Excluding China, India, Republic of Korea and Singapore, Bangladesh, Indonesia, Malaysia, Pakistan, Phillipines and Thailand are partially self reliant at the end of the project.

Radiation Technology p41 and 44

".....radiation curing technology and radiation vulcanization of natural rubber latex (RVNRL) have limited achievements....."

Nucleonic Control Systems p44 to 45

".....some installation difficulties with the NCS system installed for coal processing have delayed the achievement of the rulestones for this area of the technology."

Concerning sustainability the following comment was made on p48

"Recognition has to be given to the high mobility and high loss rate of trained personnel from the Government service in many countries. Since the National Institutes are the main backstop for the technology, training programmes should be designed to take into account the continuing need for instruction"

From the National Coordinations Meetings for Radiation Technology, Nucleonic Control Systems and Tracer Technology, and Nuclear Analytical Techniques, it was concluded that the formal training aspects of the outputs had been largely achieved but that the rest of the project would be devoted to giving either accelerated assistance to the lowest developed Member States or reinforcing the sustainability of the transferred technology.

Within the constraints of the operation of an RCA regional project, it would be the regional view that when the requirements for sustainability of the outputs were included in the evaluation, the level of activities set for each output were justified.

- 3.3 In spite of the Review Mission Experts opinions, RCA Member States have supported the project work on detoxification of flue gases as being relevant to their national needs and very positive responses have come from their electricity generating authorities in some cases.
- 3.4 The training of personnel in NDT to achieve certification was not stated to be a priority of the RCA Member States either in the design and refinement of the original project document or at the Meeting of National Coordinators which reviewed the project in detail in September 1993. Neither has these concerns been raised officially at the RCA Working Group Meeting in March 1994 nor the RCA General Conference Meeting in September 1994. There has therefore been no indication of a revision being required and consequently no mandate in any changes been requested.
- 3.5 Project Monitoring is achieved through the following mechanisms :
  - a. Reports of National Coordinators. It is a requirement of the Agreement, in Article V(2), that each country has to submit an annual report on their activities under the project. The Agency's Technical Officers review these documents and also directly monitor individual countries when making duty visits.
  - b. Expert Visits. The long term expert for tracer technology together with an independent expert has been carried out missions to nine countries in the period November 1994 to January 1995 to monitor the sub-project and the long term expert for nuclear analytical techniques has undertaken missions to six countries to monitor the sub project.

- c. Technical Officer Monitoring . Technical Officers monitor the expert reports and themselves undertake duty travel to the Member States periodically and undertake monitoring.

All experts recruited by the Agency for project activities supply a report on their missions, which is reviewed by the Agency's Technical Officer.

It would appear that all reasonable steps have been taken to monitor the project from both the implementing Agency's and the recipients perspective. Without reference to specific problems, it is difficult to see the need for an external audit over and above that given by the Mid Term Review team.

- 3.6 As stated in the response to 3.2, the project emphasis has now been moved to preparing each country to be self-sufficient at the end of the project.

- 3.7 The comment that the Counterpart Institutions have been very effective in furnishing the necessary information to national authorities and local industry is not supported by the outcome of the Tripartite Reviews Meeting in September 1994 which concluded that a programme was necessary to give added emphasis to the promotion and awareness of the technologies directed at decision makers, senior policy makers and the general public because of problems with information flow to national authorities.

- 3.8 It is expected that the impact of the Project on the total national efforts in technology transfer would be very limited, given the major technological changes taking place in the region. It had never been considered that these technologies being transferred would fit into anything other than specific niches.

With most national nuclear centres in the region having enforced programmes requiring them to be more interactive with industry and other sectors, and also the emphasis for them to bring in revenue from consulting and sales activities, there is little reluctance in transferring technology.

- 3.9 The outcomes of the three recent National Coordinations Meetings in Radiation Technology, NCS and Tracers and Nuclear Analytical Techniques have also come to the conclusion that most of the formal regional training requirements have been fulfilled, nevertheless there were requirements for national events, because Member States do not believe that they have reached a level of sustainable capacity in the majority of cases.

- 3.10 As set out in the approved Project Document, it was planned to have three meetings for each of the National Coordinators groups.

The first meetings had the function to take the broad outlines in the Project Document and convert them into implementable activities specifically tailored to the priorities and needs of the Member States. The output for each meeting was a working document, agreed by all participating Member States.

The second meetings, three of which have already been carried out, were Mid Term Reviews so that Member States could have the opportunity to review the progress of each of the subproject areas and make the necessary changes to activities to ensure that the outputs would be met and any fine tuning could take place.

The Final meetings are planned for the end of the project in late 1996 and will focus on recording the outcome of the project from the Member States' perspectives. Their inputs will form the data base for the Terminal Report.

It is surprising that the Review Team could not appreciate that the activities, as set out in the Project Document, were to be worked on to a major extent in order to make them implementable and this had to be done in a democratic and transparent manner so that all participating Member States could have the opportunity of being involved in the decision making process. Within the Articles of the Agreement and the spirit of regional cooperation and collaboration, this is the agreed mechanism that has been used since the start of these types of projects in the early 1980's.

As set out in the Terminal Report for RAS/86/073 in "Conclusions and Recommendations" p56 paragraph 2.

"A future Regional programme of activities should continue to exploit the extensive networks set up during this Project for both the overall management and coordination as well as the sub project technical linkages"

It should also be noted that the UNDP funding for these meetings is less than 5% of the overall budget, which is a very modest overhead for the benefits that Member States believe they from these events.

- 3.11 The outcome of the three National Coordinators meetings also concluded that the outputs, as far as regional training was concerned, had largely been met. Those scheduled in 1995 and 1996 had been designed to meet specific Member States requirements. The needs of individual Member States in particular areas would be addressed through the national training events.

- 3.12 The finding that "Network is weak" is difficult to understand in the context of the available facts, which, as conceded in the following sentence, shows that there is strong communications between the counterparts and the coordinators surrounding meetings, training events and seminars. As stated in 3.10, this is in full support of standard agreed RCA procedures and practices.

Under the requirements for networking associated with meetings of regional counterparts or coordinators, regional training courses, workshops and seminars, there are obvious demonstrated needs for networking and these are fulfilled by the National Coordinators.

The thrust of the criticism from the Review Team appears to be on communications outside of these needs. It is not clear what degree and type of communication would be reasonable to expect outside this framework.

On the TCDC front there are documented examples of this as meaningful dialogue and collaboration. More casual communication is accounted for through the Regional Newsletter, which has a wide distribution and is produced quarterly.

Their comment on the cost is unsubstantiated since it has already been shown that this management cost is a very modest amount, less than 5% of the budget. Further the suggestion of using an e-mail network as a means to get consensus decisions on the four sub projects from each of the groups of National Coordinators within the 17 Member States in RCA, must be viewed as totally unrealistic.

- 3.13 The recruitment of the long term experts has to be undertaken under the IAEA procedures through a process of advertisement and selection which is subject to the principles of rotation. Such a mechanism does not allow the recruitment of long term experts in the same specific way as can be employed with the recruitment of short term experts.
- 3.14 Given the wide variation in the national support given to nuclear research institutes, the differing needs of the national industries and end users for the technology, and the varying emphasis given by nuclear research institutes to transfer of technology, it is hardly surprising that there is a wide disparity in the levels of technology transferred.



3.15 The problems with radiation protection have been raised at the National Coordinators Meeting for Radiation Protection held 20 - 24 March 1995. Many of the problem are best dealt with outside the project. The radiation protection materials being prepared under the Australian extrabudgetary contribution to RCA are seen to be helpful in some of the requirements.

3.16 The statements in this item of report are not wholly correct. The current practice is for RCA Member States to offer to host regional events and this offer is evaluated on their capability to have adequate infrastructure to support the event.

While the countries at the lower stage of development are given priority, in recognition of the known benefits (as stated by the Review Team in their comments), if the cost of providing equipment and additionally lecturing support become excessive and beyond the available budget, a country with lower costs is selected. This procedure only benefits host countries with advanced capabilities when there are special equipment requirements which they have already fulfilled. It is usually to make extensive use of local expertise and a significant amount of lecturing load is taken by experts.

It also needs to be borne in mind that a conscious effort is made to spread the benefits of hosting all RCA training events in as many Member States as possible.

3.17 A training course in Nuclear Analytical Techniques on ISO-25 will be held in 1995. While the comments are useful, there are not a specific component of all outputs and these outputs involving international standards may involve more specific ISO standards.

3.18 The recommendations given here do not recognize important Articles in the Agreement which ensure that Member States are adequately committed to the RCA programme. Article V(II) states that:

"Each Participating Government shall make available the necessary scientific and technical facilities and personnel for the implementation of the cooperative project"

and Article V(3) states that:

"Each Participating Government, subject to its domestic laws and regulations, and in accordance with its respective budgetary appropriations, shall contribute, financially and otherwise, to the effective implementation of the cooperative project and shall notify annually the Agency of any such contribution".



**JOINT UNDP/RCA/IAEA PROJECT RAS/92/073**

**SECOND MEETING OF NATIONAL CO-ORDINATORS FOR RADIATION TECHNOLOGY**

**HO CHI MINH CITY, VIET NAM, 21 - 25 NOVEMBER 1994**

**1. OPENING SESSION**

The Meeting was opened by Dr. Nguyen Tien Nguyen, Director, Viet Nam Atomic Energy Commission. In welcoming the participants to Viet Nam and Ho Chi Minh City, he said that it was a great privilege to be able to host this National Co-ordinators Meeting. He reviewed some aspects of the work on radiation technology that had occurred since 1979 in the research programme of the Viet Nam Atomic Energy Commission, noting its importance to their overall programme. He said that the RCA programme was amongst one of the most important subjects in the Commission's activities. In concluding he expressed his hopes for a successful Meeting and looked forward to hearing about other member States experiences during the discussions. The full text of his comments is given in Annex 1.

Dr. John F. Easey, RCA Co-ordinator welcomed the participants on behalf of the IAEA. He thanked the Vietnamese Government for agreeing to host the Meeting and thanked the organizing committee from the Viet Nam Atomic Energy Commission for their hard work in having the arrangements so well organized. He noted that this would be the first meeting of National Co-ordinators of any of the project areas since the Tripartite Review Meeting held in Vienna on 24 September. The outcome of the TPRM would affect all activities in the joint project and all National Co-ordinators needed to be aware of these changes so that these could be rapidly and smoothly incorporated into the programme.

He welcomed the entry of Myanmar and New Zealand into the RCA during 1994 and the presence of a representative of Myanmar at this NCM. In conclusion he expressed hopes for a stimulating week of discussions and the further cementing of the close relationship that existed between the National Co-ordinators.

Dr. Vo Van Thuan was unanimously elected Chairman for the Meeting. Dr. Thuan thanked the delegates for the honour of being Chairman.

The participants and observers introduced themselves to the Meeting. There were sixteen National Co-ordinators present, only New Zealand had not been able to be represented. There were five observers, four from Viet Nam and one from China. The IAEA was represented by Dr. J.F. Easey, the RCA Co-ordinator, and Dr. V. Markovic, the project

Technical Officer. The Government of Viet Nam was represented by Dr. Le Dung and the Viet Nam Atomic Energy Commission by Dr. Nguyen Tien Nguyen. The full list of all those attending is given in Annex 2.

The draft Agenda (Annex 3) was reviewed and accepted.

Dr. Easey outlined the sequence of events that had lead to the development of the current joint UNDP/RCA/IAEA project following the end of the second phase of the UNDP Industrial Project in 1991. He reviewed the achievements of that project and the tasks to be carried out in the present one.

Dr. Markovic reviewed the project activities that had taken place in the 1994 programme and noted that all activities were implemented as planned. The extrabudgetary contribution from Japan was particularly important to execute all components of the Work Plan.

## **2. COUNTRY REPORTS**

National Co-ordinators were asked to prepare Country Statements for presentation at the Meeting and for inclusion in the Meeting report.

Each National Co-ordinator made an oral presentation bringing out the most important points in the written report. After each presentation there was a general discussion on the matters raised.

The full texts of the Country Reports are contained in the following Annexes:

Australia	-	Annex 4
Bangladesh	-	Annex 5
China	-	Annex 6
India	-	Annex 7
Indonesia	-	Annex 8
Japan	-	Annex 9
Republic of Korea	-	Annex 10
Malaysia	-	Annex 11
Mongolia	-	Annex 12

Myanmar	-	Annex 13
Pakistan	-	Annex 14
Philippines	-	Annex 15
Singapore	-	Annex 16
Sri Lanka	-	Annex 17
Thailand	-	Annex 18
Viet Nam	-	Annex 19

### **3. TECHNICAL SESSION**

During the technical session there was a full discussion on many topics, including those specifically itemized in the Agenda:

- Industrial opportunities;
- identification of industrial projects;
- promotion of technology;
- transfer of technology;
- research and development;
- education and training;
- international co-operation (bilateral, multilateral, United Nations etc.)
- Economics;
- Radiation sources, engineering, safety, materials, etc.

All of these were relevant to the formulation of the Work Plans for 1995 and 1996. It was emphasized that all the project needs and requests for project support had to be viewed from the perspective of achieving the Outputs specified in the Project Document and needed to conform to the priorities agreed at the recent Tripartite Review Meeting. The Technical Officer reminded the participants of the need to link the National TC projects where they existed, with this regional programme to ensure the optimum use of resources. The RCA Co-ordinator reviewed the financial resources expected from UNDP for 1995 and explained about their distribution between the Regional and National components.

### **4. CONCLUSIONS AND RECOMMENDATIONS**

In continuation of and in accordance with the discussion and conclusions of the first Meeting of the National Co-ordinators of the Sub-Project Radiation Technology, this second Meeting reviewed, in detail, the work carried out by the participating Member States.

The following conclusions and recommendations were agreed by all participants:

- . it was emphasized that the outputs should be identified with the stated objectives of Sustainable Human Development, the results should particularly stress the sustainability in Member States;
- . the Meeting noted that the RCA structure facilitates technical backstopping on a regional basis fortifying the national programmes. The participation of new RCA/UNDP Member States (New Zealand, Myanmar and Mongolia) was welcomed;
- . the Meeting recognized the investment from the earlier Regional and National programmes on Radiation Technology as a springboard to its more extensive and intensive utilization by the Member States;
- . the Meeting noted the outcome of the Tripartite Meeting that took place in September 1994 and requested that there should be no detrimental financial impact on this sub-project. However, it was unanimously agreed that every effort should be made to adhere to the project design and achieve all outputs as detailed in the Project Document.
- . the Meeting supported the initiatives for public awareness and promotion in order to demystify the role of radiation related technologies and their contribution to the quality of life and the community;.
- . the Meeting acknowledged the need for vocational training of technicians and support staff;
- . the Meeting recognized the desirability of effectively co-ordinating regional bilateral and multilateral activities to ensure the optimal use of the resources;
- . the Meeting recognized the importance of recording all inputs into the project, particularly those not requiring the RCA resources, was agreed that National Co-ordinators would endeavour to adequately document all contributions to the achievement of the objectives;

Member States would strive to make use of their extrabudgetary contributions to RCA to supplement priority activities. Further, the Member States were requested to explore their increased contribution to TCDC and the participation;

Member States agreed to identify resources and expertise that could be used to increase the utilization of regional investments in the area of nuclear science and technology and enhance sustainability;

following full discussions of the projected needs of Member States, the Meeting agreed to recommend a programme of regional and national activity for 1995 and tentatively for 1996 as detailed in Annexes 20, 21 and 22 respectively;

the National Co-ordinators requested the Agency to request the Governments to make available to them the names and particulars of candidates nominated to RTC and RWs. The Meeting encouraged the Co-ordinators/Counterparts to ensure, through their governments, the suitability of the candidates for RTC/RWS and adequate follow-up for effective dissemination of information/experience gained by the participants;

the National Co-ordinators stressed the need for more frequent, effective and informal exchange of information regarding the activities in the Member States and suggested a Newsletter (in any suitable medium); such Newsletters can be powerful tools for the sharing of the experiences, particularly during the period between the formal meetings of the co-ordinators. The focal point for collection of information and preparation of the Newsletter could be the Co-ordination Office in Jakarta;

it was agreed that the National Co-ordinators would prepare their next Country Reports, focussing on the achieved results/outputs in respect of the specific objectives and also identify the missing links, if any; this type of Report would greatly help in the preparation of the terminal report. In this connection, it was suggested that the reports, particularly for reviewing by non-technical personnel, should bring out the salient features comprehensible and appealing to an end user without compromising the technical accuracy;

it was also agreed that the National Co-ordinators would submit to RCA Co-ordinator by 1 January 1995, their requirements of support for RTC, RWS, NTC, NS/NW, giving the scope and objectives, the type of audience, the number and duration of experts and the time and venue (see item 5.6 of the Report of the first Meeting);

the Meeting also agreed to hold the third Meeting of the Co-ordinators, around the time of the proposed International Symposium on Radiation Curing scheduled for December 1995 in Thailand; this timing would give them an opportunity to attend the Symposium and also exchange/share the information on the latest developments in this field. National Co-ordinators should participate as a group and the Agency Technical Officer should contact the organizer and make the appropriate arrangements;

the Meeting agreed that the full potential of the applications of radiation technology to industrial and environmental needs could best be achieved through a continuing regional project. In order to achieve a smooth transition from the present programme the Agency was asked to formulate a programme outline that would prepare Member States for the needs in the period 1996 to 2001; and

the Meeting requested the Agency to prepare a project design and materials suitable for the requirements of the next 5 year UNDP funding cycle (1997 to 2001) and to develop a strategy for lobbying UNDP for financial support.

## **5. CLOSING SESSION**

Dr. Easey thanked the participants for their strong contributions to the discussions during the week. He said that the Meeting had been able to develop a strong programme of activities for 1995 and 1996 and also the new initiatives that came from the output of the Tripartite Review Meeting were understood and could be implemented with the assistance of the National Co-ordinators. On behalf of all the participants he praised the skill and hard work of the organizing committee who had contributed greatly to the success of the Meeting. In concluding he looked forward to the 1995 programme and wished everyone a safe homeward journey.



**REGIONAL EVENTS IN RADIATION TECHNOLOGY****1995**

<b>ACTIVITY</b>	<b>DATE</b>	<b>TITLE AND LOCATION</b>	<b>CODE</b>
1.7.6	27 February - 10 March 1995 (completed)	Regional Training Course on "Advanced Applications of Radiation Technology - Biomedical Applications of Radiation Technology", JAERI/TRCRE, Takasaki, Japan.	RAS/8/070.006
1.6.4	13 - 17 November	Regional Training Course on "Application of EB Technology to Flue Gases", JAERI/TRCRE, Takasaki, Japan	RAS/8/070.007
1.6.1	10 - 14 July	Regional Training Course on "Application of Radiation Processing for Decontamination of Liquid Wastes", JAERI/TRCRE, Takasaki, Japan	RAS/8/070.008
2.1.3 and 2.3.2	21 - 25 August	Regional Workshop on "Safe Operation of Industrial Radiation Facilities", Japan.	RAS/8/070.009
2.1.3	Kuala Lumpur date: open	Regional Training Course on "Industrial Sterilization, Regulations, Standards and Enforcement", (To be decided)	RAS/8/071.015
1.7.5	11-16 December	3rd Meeting of National Co-ordinators, Bangkok, Thailand	RAS/8/070

**REGIONAL EVENTS IN RADIATION TECHNOLOGY**

**PROPOSED FOR 1996**

ACTIVITY	DATE	TITLE AND LOCATION	CODE
2.1.3 and 2.1.4		Regional Training Course on "Process and Quality Control in Radiation Processing"	
1.7.8 2.1.2 2.3.3		Expert Group Meetings to produce "Guidelines for operating procedures, safe operation, process and quality control of industrial radiation facilities".	
1.7.1		Regional Training Course on "Radiation Curing" (*) (*) subject to be defined	
1.7.5		4th Meeting of National Co-ordinators	

**REQUESTS FOR ASSISTANCE FOR NATIONAL PROGRAMMES****IN****RADIATION TECHNOLOGY FOR 1995**

<b>COUNTRY</b>	<b>ACTIVITY</b>	<b>SUBJECT</b>	<b>Man Weeks</b>
CHINA	2.1.2	NTC/RS	2
	1.6.4	NS/FG	2
	1.7.10	NS/RVNRL	2
	1.7.1	NW/RC (UV,EB)	2
	2.3.3	NW/Cost Effectiveness	1
INDIA	1.7.10	NS/RVNRL	2
INDONESIA	1.6.6	Exp/FG	1
	1.3.3/1.7.7	NTC/FG	2
		Exp/Safety EB	1
	2.3.3	Exp/guidelines	2
		NS/pharmaceutical	1
	2.1.5	NTC/Standards RS	3
REPUBLIC OF KOREA	1.6.5	NS/FG	2
MALAYSIA	1.6.5	NS/FG	2
MONGOLIA	-	Pre-project mission SV	2) extra 2) RCA
MYANMAR	1.7.7	Pre-project mission	2 extra-RCA
		NS/RXL	1
		SV	2
PHILIPPINES	2.1.2	NTC/RS	1
		Exp/feasibility	2
SRI LANKA	1.7.3	NTC/RCh	2

THAILAND	1.7.3	NTC/RCh (emphasis polymers)	2
	1.6.6	export/FG	1
VIET NAM	1.7.4	Exp/RC	1
	1.7.4	Exp/RXL	1

### **Key**

NS	National Seminar
NTC	National Training Course
NW	National Workshop
Exp	Expert
SV	Scientific Visit
RC	Radiation Curing
RCh	Radiation Chemistry
RS	Radiation Sterilization
RVNRL	Radiation Vulcanization Natural Rubber Latex
RXL	Radiation Crosslinking
FG	Flue Gases
EB	Electron Beam

**JOINT UNDP/RCA/IAEA PROJECT RAS/92/073**  
**SECOND MEETING OF NATIONAL CO-ORDINATORS FOR**

**NUCLEONIC CONTROL SYSTEMS AND TRACER TECHNOLOGY**

**Holiday Inn, Colombo, Sri Lanka, 13 to 17 February 1995**

**1. OPENING SESSION:**

The proceedings started with the traditional lighting of the Oil Lamp. Those taking part in the ceremony were: Mr. H.A. Wimalagunawardena, Secretary, Ministry of Science, Technology and Human Resources Development; Dr. Prinath Dias, Chairman, Atomic Energy Authority; Dr. Douglas Nethsinghe, former Chairman, AEA, Dr. John F. Easey, RCA Co-ordinator; Dr. Wandowo, Long-Term Expert for Tracer Technology; and, Mr. D.G.L. Wickramanayake, National Co-ordinator for NCS and Tracer Technology and for Non-Destructive Testing.

The Welcome Address was given by Dr. Prinath Dias. He noted the high level of success being achieved in the RCA programme and thanked all those involved. He detailed the contribution of the RCA, IAEA Technical Co-operation and other Programmes to the development of the nuclear technology projects in Sri Lanka and enumerated the various activities currently being carried out. He expressed his thanks to his Ministry and the Minister for their receptive and co-operative attitude to the Atomic Energy Authority. He briefed the meeting on the developments that should lead to the establishment of AEA laboratories in 1997. In concluding he gave the participants his best wishes for a good meeting and a pleasant stay in Sri Lanka. The full text of his remarks are given in Annex 1.

Mr. H.A. Wimalagunawardena gave the Inaugural Address. He welcomed the participants from the Member States on behalf of the Minister, Honourable Bernard Soysa, and noted the special interest that the Minister had taken in assisting the staging of the meeting. He thanked the IAEA and UNDP for their assistance and noted the achievements of a number of specific projects. In conclusion he drew attention to the potential for the nuclear technologies being transferred to impact and assist in the process of improving the quality of life and expressed the hope that these advances would be further promoted. He wished all participants a pleasant stay in Sri Lanka.

Dr. Easey welcomed the participants to the meeting on behalf of the Director General, International Atomic Energy Agency. He thanked the Government of Sri Lanka for agreeing to host the event and the Atomic Energy Authority for its efficient handling of the arrangements. He reviewed the purpose of the Meeting. He outlined the structure of the RCA programme, emphasizing the special features associated with the decision making and funding. He noted the importance of the Member States' "in-kind" contributions to the total programme achievements. The impact of the reduction in UNDP funding was briefly reviewed. He concluded by again thanking the Government of Sri Lanka and the AEA for their strong co-operation and support. The full text is given in Annex 2.

Dr. Dias made some additional welcoming remarks on behalf of the AEA and then invited the participants to introduce themselves to the meeting. National Co-ordinators from 14 RCA Member States were present; only Japan, Myanmar and Singapore did not send a representative. The full list of participants is given in Annex 3.

In response for nominations for electing the Meeting Chairman, Thailand nominated Dr. Dias and this was seconded by Pakistan and Republic of Korea. Dr. Dias was unanimously elected.

The Chairman asked the Meeting to review the draft agenda and it was modified to include presentations by the IAEA Technical Officers Dr. Lewkowicz and Dr. Yurtsever at the start of Technical Session 1 before the Country reports. The adopted agenda is given in Annex 4.

Dr. Easey gave an overview of the UNDP/RCA/IAEA programme starting with a review of the outcome of the Tripartite Review Meeting held in Vienna on 24th September 1994. He noted the two new areas for emphasis in the Programme agreed at that event, namely: public acceptance and promotion of the technologies and, technician training. He outlined the response to the inclusion of these activities and the strategies proposed to incorporate them in the work plan for 1995 and 1996.

He then referred to the unexpected fax from Mr. Sebastian Zacharia on 30 November 1994 detailing the mandatory cuts to be made to the budgets for 1994, 1995 and 1996. Details were given of the specific reductions for each year and the breakdown of available resources for 1995.

Mention was made of current efforts being made to persuade Member States to lobby hard for UNDP funding to be restored for this project. It was pointed out that decisions were being made by the UNDP Executive at their mid-year meeting on the future of the 5th and 6th Inter-country Programme Cycles and of the 36 countries represented there, all seven developing countries from Asia and the Pacific were RCA Member States: Bangladesh, China, India, Indonesia, Republic of Korea, Pakistan and Philippines. The National Co-ordinators from each of these was asked to convey their and the Meeting's concerns back to their Governments for possible inclusion in briefing materials for those attending the UNDP Executive Meeting. Australia, Japan and New Zealand were also requested to assist in making representations through their missions to UNDP in New York.

Dr. Easey reviewed the outcome of a high level meeting on Environmentally Sound and Sustainable Development in Asia and the Pacific which he had attended from 7 to 10 February 1995. He said that the two main objectives of this Meeting were to draft the Regional Action Plan for Sustainable Development and to prepare the draft Ministerial Declaration on Environment and Development in Asia and the Pacific for consideration in November 1995 at the planned Ministerial level meeting. In particular he emphasized the four objectives that had received prominent attention and outlined possible programme titles that might be associated with each. He suggested that these items would probably feature strongly in the priorities of UNDP, ESCAP, donors and funding agencies when they considered proposals for future financial support. A copy of the overhead slides used is given in Annex 5.

## **2. TECHNICAL SESSION I**

The Long-Term Expert for Tracer Technology, Dr. Wandowo reviewed the three objectives and outputs for the areas covered by Nucleonic Control Systems and Tracer Technology. His report is given in Annex 6.

The two Technical Officers Dr. Lewkowicz and Dr. Yurtsever made presentations outlining the RCA programme as well as the wider Agency programme in these areas. It was noted that there were possibilities for supplementing and extending the support for the RCA programme. In addition both Technical Officers said that the knowledge of the Member States' priorities would also be of assistance in formulating the future programme. An abstract of Dr. Lewkowicz comments is given in Annex 7. Copies of overhead transparencies detailing information presented by Dr. Yurtsever is given in Annex 8.

### **3. COUNTRY REPORTS**

In the pre-meeting announcements, the National Co-ordinators were asked to prepare a Country Statement for presentation at the Meeting and inclusion in the Meeting Report. They were asked to include information on:

- National events contributing to the outputs of the project; especially those not requiring Agency support;
- the utilization of support received from the Project including use being made of skills and knowledge acquired by participants who had attended Regional Training events;
- how progress is being made to achieve each project output from the National perspective;
- indications of how activities build up local technical backstopping capacity.

Each National Co-ordinator made an oral presentation and there was a discussion period following this. The full text of each Country Report is given in the following Annexes:

- |                     |            |
|---------------------|------------|
| - Bangladesh        | - Annex 9  |
| - China             | - Annex 10 |
| - India             | - Annex 11 |
| - Indonesia         | - Annex 12 |
| - Republic of Korea | - Annex 13 |
| - Malaysia          | - Annex 14 |
| - Mongolia          | - Annex 15 |
| - Pakistan          | - Annex 16 |
| - Philippines       | - Annex 17 |
| - Sri Lanka         | - Annex 18 |
| - Thailand          | - Annex 19 |
| - Viet Nam          | - Annex 20 |



Following the presentation of Country Reports, Dr. Easey led a discussion on the progress of the various countries to achieving the Outputs 2 and 3 stated in the Project Document. Emphasis was placed on the need to ensure the sustainability of the project when the formal funding support was finished. There was discussion on how to improve the dissemination of knowledge and information presented at regional training events. It was agreed that participants who had benefitted from such events needed to contribute to their national programme by ensuring that they made the information as freely available as possible. Dr. Easey outlined some new arrangements where regional training materials were being directly distributed to various National Co-ordinators and Counterparts as a contribution to widening the information base.

There was a preliminary analysis of the Country Reports and this assessment indicated that only Bangladesh and Mongolia were in need of additional assistance to bring them up to the next level of achievement. It was emphasized that the National Tracer Group (NTG) was supposed to provide the basic technical backstopping capacity in each country.

Considerable merit was placed on the establishment of physical models in the NTG laboratories so that they could develop their skills and gain experience and confidence in all facets of operations, prior to carrying out field work.

Common themes found in the country presentation were discussed in preparation for the identification of areas of focus and support in the 1995 and 1996 programme of activities.

Dr. Wandowo presented an overview of "NCS and Tracer Technology Resources in RCA Member States" (Annex 21) Dr. W. Zuk, ANSTO, made a presentation on "NCS and Tracer Technology in Australia" (Annex 22) and Dr. G. Wallace made a presentation on "NCS and Tracer Technology in New Zealand" (Annex 23).

#### **4. TECHNICAL SESSION II.**

There was a round table discussion to determine the technical programme for 1995 and 1996. It was emphasized that the 1996 funds from UNDP were not guaranteed and that some options would have to be scheduled into the work plans to enable a flexible response.

Dr. Yurtsever had circulated a draft prospectus for the proposed Regional Workshop on the "Use of Tracer Technology to Study Dispersion of Effluents in Groundwater" (Annex 24). This document was discussed and a number of comments were made by the participants.

It was agreed that:

- the timing would be finalized by 1 March 1995 and would place the RW in the second half of the year, probably August to October;
- although the probable location for the RW would be in Indonesia, Pakistan had offered to host the event if there were timing difficulties that would prevent the implementation in 1995;
- the duration of the RW will be three weeks to give adequate coverage of topics;
- the lecture topics and experimental work would include the use of both environmental isotopes and artificial radioisotope tracers;
- there would be emphasis on the need for a multidisciplinary approach to groundwater studies and include such topics as geochemistry and geophysics.

Dr. Easey said that the commitment to China of RCA support for events to coincide with the International Conference on Isotopes 7 to 12 May 1995 had been severely eroded because of the UNDP budget cuts which had necessitated the bringing forward of the National Co-ordinators Meeting to this date in Sri Lanka and the postponement of the two regional training events in NCS. He proposed that an essentially "cost free" event be held in Beijing to enable the commitment to be partially honoured. An Expert Meeting on the use of RTD computer models for analysis of industrial flow data was proposed and further it was to be attended by experts funded from their countries extrabudgetary contribution to RCA. It was therefore, expected that experts from India, Indonesia, Republic of Korea, Malaysia, Philippines and Thailand could attend, if their Governments endorsed this proposal.

Member States requiring assistance for national executive management seminars on promotion of the technologies would notify the RCA Co-ordinator on their needs by 1st March.

The arrangements for the demonstration experiments were difficult to decide because of the UNDP funding cuts and there would be correspondence on these activities when the funding position was clarified. It was emphasized that merely observing experimental work was not very effective in transferring additional skills and knowledge and that "hands on" involvement in the practical work as well as the design and implementation was important in the learning and absorption process.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

The following observations and conclusions were made by the Meeting:

- . the outcome of the Tripartite Review Meeting held in Vienna on 24 September 1994 with its new emphasis on promotion and public awareness of the technologies and on technician training was noted;
- . the severe reduction of funding from UNDP to support the activities in the 1994 - 1996 segment of the project document will cause difficulties in achieving all the outputs;
- . the Meeting noted the UNDP's request for the RCA Coordinator to explore additional co-financing possibilities to offset the reduction in their funding. It was generally concluded that the Joint Project had a very high degree of co-financing already, in line with UNDP's previous desires and achieved what was probably the highest degree of co-financing in the 5th Intercountry programme cycle in Asia and the Pacific. This should impose on UNDP a responsibility to restore as much of the cut funding as possible to regain confidence of the co-financing bodies and enable the integrity of the project to be maintained;
- . the work programme for 1995 and 1996 will have to be revised to take account of the possibility of there being no UNDP funds for 1996 and reduced funds for 1995;

- procedures will need to be further strengthened to try to ensure sustainability of the skills and knowledge being brought into these areas of technology. In particular the benefits derived from regional events will need to be carefully managed to ensure that individuals and national institutions involved, disseminate information in an effective and efficient manner to the national interest groups;
- most Members States have made significant progress to achieving the two outputs set for training of personnel in process optimization and effluent studies in surface and ground waters but further activities are required to ensure the practical utilization of knowledge and skills and to adequately contribute to the promotion and public awareness aspects;
- since both Bangladesh and Mongolia do not have highly developed tracer technology capability, they will require additional inputs of assistance to bring them up to the general level of capability of the other countries;
- it is extremely important to provide "hands on" experience in carrying out tracer field studies and in particular in the design and planning of such work;
- the use of open and distance learning (ODL) materials to address the needs for technician training was considered to be a very appropriate means for vocational training. It was recognized that materials prepared in one country might require modification and adaption to suit the conditions in another;
- it was noted that the Australian extrabudgetary funded RCA project producing ODL materials for radiation protection, as applied to industrial applications of nuclear techniques, would significantly contribute to achievement of the technician training objective developed at the Tripartite Review Meeting;
- there was general agreement that there should be focus on specific targets for the activities to be conducted in 1995 and 1996 to enable specific skills to be established on a region wide basis and thus contribute to sustainability. These targets would best be selected so that there could be significant bilateral assistance within the scope of TCDC, with both resource and recipient institutes located in the region;

- . it was deemed important for future project objectives and directions to be developed so that longer term planning of Agency support and interfacing of the other Agency's programmes, could be efficiently undertaken;
- . the Meeting noted that there had been a significant input of training and facilities into the Region from the IAEA'S programmes in the applications of environmental isotopes for many years. The utilization of this investment through incorporation of these techniques into the tracer studies of environmental pollution is directly in line with the objectives of the project and will greatly assist the studies, providing considerable benefits from these existing specialized technologies;
- . the importance of a multidisciplinary approach to the tracer studies was emphasized;
- . the maturing of the RCA programme was seen to be reflected in the changing nature of the interactions with the Member States, which had now progressed from essentially a one way technology transfer process to bilateral or multilateral partnerships in a variety of projects;
- . in view of the severe constraints on the availability of funds and of the fact that many Member States have achieved a reasonable level of sustainability of NCS in their industries, no new initiatives would be planned at the present for 1995 and 1996. The situation would be reviewed by correspondence in the light of any changes of availability of funds.

Following the consideration of these conclusions and the discussion in the Meeting, the following recommendations were made:

- . it was recommended that all National Coordinators convey their own and the Meeting's concerns about the reduction in the UNDP funds for the Joint Project which would reduce the capability to address the important areas of public awareness and promotion of the technology and limit the project's response

to the output of the Tripartite Review Meeting. These concerns should be registered with the UNDP Counterparts and the National RCA Coordinators and they should be asked to arrange for the UNDP Country Office and UNDP Headquarters to be made aware of the issues. It was also recommended that there should be supportive briefing materials presented illustrating the positive contribution and strong achievement of the RCA projects that have been supported by UNDP funds.

- . it was recommended that all National Coordinators request their Governments through the appropriate channels, to consider making additional financial contributions to the Joint UNDP/RCA/IAEA Project to help off-set the impact of the reduction in UNDP funding. Specifically there might be possibilities for reducing direct costs by increasing 'in kind' contributions. An additional option might be to direct extrabudgetary cash contributions to RCA specifically into the Joint UNDP/RCA/IAEA Project.
- . it was recommended that the activities until the end of the Project should concentrate on topics which would be presented as realistic and achievable goals and would be identifiable as specific achievements for later evaluation. The topics agreed upon were:
  - a. distillation column scanning in the petrochemical industry;
  - b. use of an RTD mathematical model for industrial process flow analysis;
  - c. flow dynamics in shallow waste water stabilization ponds;
  - d. dispersion of sewage discharges from ocean outfalls;
  - e. quantitative studies of sediment transport to support dredging and harbour operations;
  - f. velocity and direction measurement of groundwater for pollution dispersion studies.

g. it was recommended that a future RCA programme focus on the environmentally sound and sustainable priority areas;

- Coastal and Marine environment.
- Land and Water Management.
- Manufacturing industries.
- Urban issues
- Hazardous Waste Management.

and develop specific proposals in line with the regional action plans.

## **6. GENERAL SESSION**

The draft report was circulated to the participants and it was reviewed on a page-by-page, line-by-line basis. The agreed comments and corrections were inserted into the text.

## **7. CLOSING SESSION**

The Chairman formally tabled the corrected draft report for adoption by the Meeting and this text was accepted as formal report of the Meeting.

Dr. Easey thanked all the participants for their contributions to the achievement of the aims and objectives of the Meeting and the realization of the agreed report. He made particular reference to the hard work and dedication of the staff from the Atomic Energy Authority who had enabled the Meeting to be run so smoothly and efficiently. Dr. Dias was formally thanked for his personal efforts that had enabled the Meeting to take place at such short notice and for spending much of his valuable time as Chairman of the various sessions. Dr. Easey reported that he had conveyed thanks from the Meeting to the Minister Hon. Bernard Soysa for the valued contribution his Government had made to the hosting and conduct of this event.

In his closing remarks, the Chairman thanked the RCA Co-ordinator for his closing comments. He noted with satisfaction the outcome of the Meeting and commented that the adoption of the conclusions and recommendations would enable the work to retain its tight focus and achieve the stated goals.

He asked the RCA Co-ordinator to include in the report a note of appreciation which had been jointly compiled and endorsed by the delegates (Annex 25). The Chairman wished everyone a safe homeward journey and declared the Meeting closed.



JOINT UNDP/RCA/IAEA PROJECT RAS/92/073

**SECOND MEETING OF NATIONAL CO-ORDINATORS FOR  
THE SUB-PROJECT ON NUCLEAR ANALYTICAL TECHNIQUES**

*combined with an*

**EXPERT WORKSHOP ON APPLICATION OF ISO-25  
AND OTHER INTERNATIONAL STANDARDS IN LABORATORIES EMPLOYING  
NUCLEAR AND COMPLEMENTARY ANALYTICAL TECHNIQUES**

**ANSTO, Lucas Heights, Australia  
20-24 February 1995**

**SUMMARY**

This meeting was attended by National Co-ordinators from fifteen RCA Member States and by four experts who had been invited to participate in a concurrent Expert Workshop on Application of ISO-25 and Other International Guidelines in Laboratories Employing Nuclear and Complementary Analytical Techniques.

Significant progress was reported in applying nuclear analytical techniques in monitoring and research on environmental problems that are considered to be of importance both nationally and regionally in RCA Member States. For the future, a number of technical recommendations were developed and fully endorsed by the meeting. It was agreed that the highest priority should be given to (1) the establishment of a new RCA Co-ordinated Research Programme on air pollution, (2) a Workshop on application of ISO-25 and other relevant standards to the NAT sub-project (to be held in 1996), (3) facilitating the attendance of selected participants at the next international Conference on Modern Trends in Activation Analysis (MTAA-9), Seoul, Republic of Korea (24-30 September 1995) together with a Technical Workshop on computer software for NAA, nuclear spectroscopy and associated data evaluation, (4) Group Fellowship Training on NAA and air pollution, (5) a workshop on chemometric evaluation of data generated by the sub-project (preferably to be organized as a separate event in 1996, but otherwise as part of the next national co-ordinators' meeting), and (6) regional fellowships.

The Expert Workshop prepared preliminary guidelines on the introduction of ISO-25 principles in nuclear analytical laboratories, and developed a number of recommendations for future actions to be undertaken by the Agency.



**JOINT UNDP/RCA/IAEA PROJECT RAS/92/073**

**SECOND MEETING OF NATIONAL CO-ORDINATORS FOR  
THE SUB-PROJECT ON NUCLEAR ANALYTICAL TECHNIQUES**

*combined with an*

**EXPERT WORKSHOP ON APPLICATION OF ISO-25  
AND OTHER INTERNATIONAL STANDARDS IN LABORATORIES EMPLOYING  
NUCLEAR AND COMPLEMENTARY ANALYTICAL TECHNIQUES**

**ANSTO, Lucas Heights, Australia  
20-24 February 1995**

**INTRODUCTION**

Dr. John Easey, RCA Co-ordinator, welcomed the participants to the meeting on behalf of the Director General, International Atomic Energy Agency. He thanked the Government of Australia for agreeing to host the event and the Australian Nuclear Science and Technology Organization (ANSTO) for its efficient handling of the arrangements. He reviewed the purpose of the Meeting and outlined the structure of the RCA programme, emphasizing the special features associated with the decision making and funding. He also noted the importance of the Member States' "in-kind" contributions to the total programme achievements. The impact of the reduction in UNDP funding was briefly reviewed. He concluded by again thanking the Government of Australia and ANSTO for their strong co-operation and support. The full text of his remarks is given in Annex 1 (page 7).

Dr. Garth Hogg, ANSTO Representative, welcomed participants on behalf of the host government, following which the participants then introduced themselves briefly. There were fifteen National Co-ordinators from RCA Member States; only Japan was not represented. In addition, there were four experts who had been invited to take part in a concurrent Expert Workshop on Application of ISO-25 and Other International Guidelines in Laboratories Employing Nuclear and Complementary Analytical Techniques. The full list of participants is given in appendix 1.

Dr. John Fardy, National Co-ordinator for Australia, was elected chairman of the meeting. The programme adopted was that set out in the previously circulated agenda (appendix 2).

The meeting started with an overview of the Nuclear Analytical Techniques (NAT) Sub-Project by the RCA Co-ordinator, Dr. John Easey, and the IAEA Technical Officer, Dr. Robert Parr. This was followed by a series of presentations devoted mainly to analytical quality assurance. Work undertaken in individual RCA Member States was then reviewed by the National Co-ordinators. All their presentations are reproduced in the appendices.

The Expert Workshop shared some technical sessions with the National Co-ordinators' Meeting; other sessions were organized separately. The full report of the Expert Workshop is reproduced as an appendix.

The remainder of this report summarizes the outcome of the discussions that took place during the plenary sessions of the meeting, and the main conclusions that were drawn from these discussions.

## **PROGRESS TO-DATE**

1. Most Member States have already made significant progress in applying NATs in monitoring and research on environmental problems that are considered to be of importance both nationally and regionally. In accordance with the recommendations from the first National Co-ordinators Meeting, emphasis has been placed on air pollution studies and analytical quality control. However, many additional high priority environmental matrices have also been studied, including sediments and soil, water and a variety of biological accumulators.
2. Manpower development has been successfully pursued through participation in activities such as the IAEA's regional and interregional training courses, as well as through a variety of arrangements with local and overseas institutions.
3. Many participants have strengthened their links with other analysts in their country, as well as with other national institutions engaged in environmental monitoring and research. This has been done through personal contacts, and in some cases, also by organizing national seminars and users' group meetings. It was agreed that the further strengthening of such links is an important objective of the Sub-Project, and should be actively pursued by participants in all Member States.
4. Procedures have been implemented for harmonizing the analytical measurement techniques that are being used both in NAT laboratories and — in most Member States — also in other collaborating non-nuclear laboratories. To-date, this has been done mainly through participation in analytical quality control exercises organized by the Agency. The first full scale evaluation of the results will take place in July 1995. However, all participants recognize the importance of this approach, and pledged themselves to take part in future exercises of a similar kind. Several participants have also initiated, or taken part in, national programmes to prepare and certify relevant analytical reference materials. NATs have been shown to play an essential role in the characterization and certification of these materials.
5. The importance of air pollution as a problem for countries in the region was emphasized in a review presented by the Chief Technical Officer, Dr. P.D. Hien. He noted that the lack of unified procedures for sampling and quality assurance among previously published studies makes questionable any attempt to compare air pollutant levels in different cities in the region. However, there is no doubt that levels of airborne particulate matter are very high in many areas; also that long range transport of air pollutants is an important factor that needs further study. The new CRP (next section) is expected to address many of these issues.
6. The original objectives and intended outputs of the project were reviewed once more, and the Meeting agreed that they are still relevant and of high priority. The RCA Coordinator, Dr. J. Easey, reminded participants that future actions within this project should be designed to achieve the intended outputs, which are internationally accepted procedures on nuclear analytical techniques for environmental studies harmonized regionally with at least one representative from each participating Member State trained to the required standards.

## **RCA CO-ORDINATED RESEARCH PROGRAMME (CRP) ON "APPLIED RESEARCH ON AIR POLLUTION USING NUCLEAR-RELATED ANALYTICAL TECHNIQUES"**

7. The meeting commended the Agency on its efforts to launch a new RCA CRP on air pollution and noted with approval that arrangements have already been made to supply participants with an air sampler of a standard design (a low volume air sampler comprising

stacked filter units capable of providing separation of airborne particulate matter into two size ranges below 10  $\mu\text{m}$ ). It was observed, however, that formal approval of this CRP has not yet been obtained. Accordingly, it was recommended, as a matter of high priority, that the Agency should make urgent efforts to secure final approval and funding for this CRP.

8. Participants provided information on their intentions to submit applications to join this CRP and on their requirements concerning the supply of air samplers. This information was noted by the Agency's Technical Officer, Dr. R.M. Parr, who also provided advice on the preparation and submission of research proposals. Participants who still wish to join the CRP were advised to submit their proposal (or an advance information copy) in time to reach the Agency by 31 March 1995.

#### **WORKSHOP ON NUCLEAR ANALYTICAL TECHNIQUES (NATs) IN ENVIRONMENTAL RESEARCH AND MONITORING, SINGAPORE, 3-7 JULY 1995**

9. The meeting noted with appreciation that the National Coordinator for Singapore had agreed on the possibility to host this event and to serve as Course Director. After discussion of the purpose and scope of the Workshop, it was agreed that the main themes would be (1) sampling and sample collection procedures for environmental samples (with particular emphasis on airborne particulate matter and sediments), (2) analytical quality assurance (with particular emphasis on the results of the intercomparison exercises carried out by that time), and (3) data collection and recording.

10. National Coordinators were advised that it is their responsibility to ensure that appropriate nominations are submitted in time to meet the Agency's deadline of 15 April 1995. Multiple nominations would be welcome to ensure that each Member States has two representatives. However, if multiple nominations are submitted, then the National Co-ordinator is requested to advise the Agency's Technical Officer, Dr. R.M. Parr, concerning their priorities.

#### **EXPERT WORKSHOP ON APPLICATION OF ISO-25 AND OTHER INTERNATIONAL STANDARDS IN LABORATORIES EMPLOYING NUCLEAR AND COMPLEMENTARY ANALYTICAL TECHNIQUES**

11. The report of the Expert Workshop (appendix 27) was noted with appreciation, and the recommendations contained in that report (to the participants, to the Agency and to the Governments) were fully endorsed. A revised version of this report will be prepared and published by the Agency. Comments on the present version are requested by 31 March 1995.

12. It was agreed that further specific training is needed on practical ways to implement the proposed procedures in the participating laboratories. It was therefore recommended, as a matter of high priority, that the Agency should explore possibilities for convening a Training Workshop on the application of ISO-25 and other relevant standards to the NAT sub-project as soon as possible. In preparation for this Workshop, the following additional steps are recommended: (1) that the Agency should prepare draft questionnaires for consideration at the Singapore Workshop, (2) that each participant in the Singapore Workshop should come prepared to provide information on, and to discuss, the current status of any efforts to implement a laboratory quality assurance programme in his/her laboratory.

## OTHER ASPECTS OF ANALYTICAL QUALITY ASSURANCE

13. Participants were reminded of the importance of timely submission of the results of on-going intercomparisons since these data are due to be evaluated and discussed at the Singapore Workshop. The assistance of National Co-ordinators in ensuring that the data are properly recorded on floppy diskettes before submission to the Agency was earnestly requested. Participants took note that the proposed deadline for submission of these data to the Agency (AQCS) is 15 March 1995.

14. It was agreed that additional quality control (QC) exercises (intercomparisons) will be necessary before the termination of the present project if the required objectives are to be achieved. The next intercomparison exercise, which should be planned to take place around the end of 1995, should comprise 2 or 3 sediment (e.g. marine, estuarine) QC materials. At a later stage, an intercomparison exercise based on biomonitors (or similar biological materials) would be useful.

15. The Agency's efforts to prepare air filter reference materials for use in connection with the CRP on air pollution were noted with appreciation. It was agreed that this is a high priority activity. Other priority reference materials are lichen, or similar materials, with high pollutant levels and urban dust (e.g. a bulk sample of airborne particulate matter).

16. For the future, it was agreed that there will be a continuing need for new QC materials extending even beyond the lifetime of the present project. Mekong Delta sediment and Asian (possibly Chinese) urban particulate matter were suggested as possible high priority materials. The Chief Technical Officer, Dr P.D. Hien, agreed to explore the matter further and to report on it at a future meeting.

## OTHER MEETINGS AND WORKSHOPS

17. Participants took note of the fact that the Ninth International Conference on Modern Trends in Activation Analysis (MTAA-9) will take place in Seoul, Republic of Korea, from 24-30 September 1995, and that the Agency has been invited to cooperate in the organization of this event. In view of the fact that the programme of this meeting is highly relevant to the NAT project — particularly for those participants who are using NAA — it was recommended that the Agency should explore ways to facilitate their attendance. In particular, it was suggested that this might be done by organizing an overlapping Workshop for NAT participants on the theme of computer software for NAA, nuclear spectroscopy and associated data evaluation (possibly including software for application of the K-O method).

18. The Agency will inform National Co-ordinators at a later time whether it is possible to make these arrangements and, if so, what the application procedure is. Participants were reminded that funding priority will be given to applicants who have submitted a paper for presentation at MTAA-9, for which the deadline is 31 March 1995.

19. The third (and final) National Co-ordinators' meeting for this project is expected to take place around September or October 1996. The location still has to be decided and offers from Member States would be welcomed. In view of the importance of this meeting, and the time needed for technical discussions, it was agreed that it should be a separate event (not combined with any other international symposium or conference).

20. Participants agreed that there is still an urgent unfulfilled need for a meeting or workshop dealing with the topic of advanced statistical techniques (chemometrics) for the evaluation of environmental data. The RCA Co-ordinator was requested to secure finances

to organize this as a separate event. If this is not possible, then it should be made the main technical topic in the programme of the third National Co-ordinators' meeting (see previous paragraph). The RCA Co-ordinator was urged to try to find the necessary financial resources.

21. Several participants expressed the need for a workshop, or some other kind of training activity, on TR-XRF and requested the Agency to explore the possibility of organizing such an event.

22. Participants took note of the fact that the Agency is planning a symposium in 1996 which is highly relevant to the NAT project, namely an international Symposium on Harmonization of Environmental Measurements Using Nuclear Analytical Techniques. It was also noted that the Agency is considering the possibility of organizing this event in Hyderabad, India, in November 1996, in association with an international symposium on ultra-trace analysis. In view of the relevance of these meetings to the NAT project, it was recommended that the Agency should try to find the means to facilitate the attendance of NAT participants.

#### FELLOWSHIP TRAINING, EXPERT SERVICES AND OTHER TECHNICAL CO-OPERATION MATTERS

23. The meeting noted with appreciation that the Agency is exploring the possibility of organizing group fellowship training in the USA on air pollution studies using NAA. A draft syllabus was provided and several participants expressed strong interest. They were advised to consult their national Atomic Energy Authority with a view to submitting a fellowship application by mid-1995. (In such cases it would be appreciated if an information copy of each such application would be sent directly to the Agency's Technical officer, Dr. R.M. Parr).

24. The meeting also noted the Agency's interest in supporting regional fellowships to promote a better sharing and utilization of resources that are already available within the region. An important example of this kind of collaboration would be to enable a scientist *without* reactor-based NAA facilities to work at an NAA laboratory somewhere else in the region to analyse his/her samples. Participants wishing to take advantage of this kind of arrangement are advised first to consult each other bilaterally on an informal basis, and then to prepare an informal pre-proposal on behalf of both partners in the arrangement. This pre-proposal should be sent to the Agency's Technical officer, Dr. R.M. Parr (with a copy to the Chief Technical Officer, Dr. P.D. Hien). If possible, this should be done by 31 March 1995.

25. Other relevant requests for fellowship training and expert services (including draft job descriptions) should be communicated to the Agency's Technical officer, Dr. R.M. Parr, in the form of an informal pre-proposal (with a copy to the Chief Technical Officer, Dr. P.D. Hien). If possible, this should be done by 31 March 1995. Participants were reminded that, in evaluating such pre-proposals, the Agency is obliged to check that they conform strictly with the agreed objectives and outputs of the NAT project.

26. Participants' attention was drawn to the fact that proposals for the next biennium of the Agency's Technical Co-operation Programme (1997/98) should be prepared and submitted during the course of 1995. Participants were therefore advised to consult their own national Atomic Energy Authority with a view to preparing a suitable proposal relating to NAT. However, the necessity for all such proposals to be in accordance with relevant national, regional and intercountry priorities was emphasized.

## **OTHER TOPICS**

27. The meeting noted that many participants would benefit from having better access to scientific literature on topics relating to the NAT project. It would therefore be highly appreciated if the Agency could find the resources to compile a selected annotated bibliography of relevant review articles, other journal articles and reports, and to provide copies of these documents in the form of a "reader". A similar set of literature data based on the Agency's INIS database would also be useful. In this connection, participants were reminded of the availability of INIS in most (or all) of their countries, and were encouraged to make use of this resource.

28. The meeting also noted that electronic forms of communication (e.g. e-mail) are a significant aid to communication between participants in the NAT project. It was recommended that those participants who do not yet have access to facilities of this kind should make urgent efforts to avail themselves of this important technical development.

## **RECOMMENDATIONS**

29. A number of technical recommendations are contained in the above paragraphs, all of which were fully endorsed by the meeting. It was agreed that the highest priority should be given to (1) the RCA Co-ordinated Research Programme on air pollution (paragraph 7), (2) the Workshop on application of ISO-25 and other relevant standards to the NAT sub-project (paragraph 12), (3) facilitating the attendance of selected participants at the MTAA-9 Conference by convening a concurrent Technical Workshop on computer software for NAA, nuclear spectroscopy and associated data evaluation (paragraph 17), (4) group fellowship training on NAA and air pollution (paragraph 23), (5) a workshop on chemometric evaluation of data generated by the sub-project, and (6) regional fellowships (paragraph 24).

30. The meeting noted with regret that there is still no co-ordination between the RCA project in NAT and the parallel activities in the regional programme on International Collaboration in Asia. All Member States were urged to use their good offices to try to obtain overall co-ordination and collaboration between these two regional programmes to achieve maximum utilization of resources and minimize the potential for overlap and competition.



**PROJECT TITLE AND NUMBER:**

"The use of Isotopes and Radiation to Strengthen technology and Support Environmentally Sustainable Development"

UNDP/IAEA/RCA Project: RAS/92/073

**Subproject:** RADIATION TECHNOLOGY.

**Project Description:** The project started in 1993 as a follow-up and expansion of two previously implemented UNDP/IAEA/RCA projects. The new emphasis is on environmental aspects and sustainable development. Radiation technology is a substantial component of the whole project. Transfer of technology is carried and supported by intensive training of manpower, training usually not available in standard academic curricula, even at the postgraduate level. Regulatory provisions and promotion of international standards, wherever applicable, are another important aspect of the project.

The project addresses two main considerations: (a) transfer and development of environmentally friendly technologies which replace other less acceptable alternatives; (b) transfer and development of technologies which actively contribute to the clean environment. Therefore, this subproject has activities with different well established radiation processes (sterilization, curing, modification of plastics, etc) and to radiation processes used for cleaning of flue gases and liquid waste (municipal and industrial).

Another important component of the project is safe operation of industrial radiation sources.

**Participating Member States:** 16 developed and developing countries from the region.

**Project Officer:** V.Markovic

**Main Achievements and Activities in 1994.**

1. A regional training course on "Fundamenta Aspects of Radiation Technology and Environmental Applications" was held in Takasaki, Japan, 6-17 June. It was attended by 15 participants and 4 observers (all from 10 countries).
2. A regional training course on " Radiation Sterilization-Validation, Routine Control and Application of ISA standards" was held in Bangkok, Thailand, 4-15 July. It was attended by 17 participants (9 countries) and 5 local observers.
3. Regional seminar on "Electron Beam Technology for Purification of flue gases" was held in Takasaki, Japan, 17-21 October. It was attended by 15 participants (10 countries) and 4 observers (4 countries).

4. Regional seminar on "Radiation Technology for Biomedical Applications" was held in Shanghai, China, 12-16 December. It was attended by 16 participants (9 countries) and about 20 local observers.
5. Regional workshop on "Radiation Processing in Industry - Process Control and Dosimetry" was held in Takasaki, Japan, 19-22 December. It was attended by 15 participants (9 countries and 3 observers).
6. 2nd Meeting of National co-ordinators for the subproject was held in Ho Chi Min City, Vietnam, 21-25 November. Activities since the start of the project and work plan for 1995 were discussed. Tentative schedule for 1996 was also discussed. The meeting was attended by all national co-ordinators.
7. Besides regional activities above, the project provided technical support (preparation of programmes, experts) for a number of national activities, such as:
  - Training course "Radiation Chemistry" - Philippines.
  - Seminar on "Radiation Sterilization" - Malaysia.
  - Seminar on "Vulcanization" - Thailand and Sri Lanka.
  - Seminar on "Radiation Sterilization" - Vietnam.
  - Seminar on "Radiation Curing" - Philippines.

All national activities were well attended with large fraction of participants from industry.

#### **Work Plan for 1995.**

1. Regional training course on "Application of Radiation Processing for Decontamination of Liquid Waste", to be held in Takasaki, Japan, 10-21 July 1995.
2. Regional training course on "Application of EB Technology for Purification of Flue Gases", to be held in Takasaki, Japan, 13-17 November 1995.
3. Regional training course on "Industrial Sterilization - Regulations, Standards and Enforcement", to be held in Kuala Lumpur, Malaysia (November 1995).
4. Regional workshop on "Safe Operation of Radiation Facilities", to be held in Takasaki, Japan 21-25 August 1995.
5. The 3rd meeting of national co-ordinators is scheduled for 11-15 December 1995, in Bangkok, Thailand.
6. Besides regional activities above 5-8 national activities (courses, seminars) will be supported by the project.

## P r o s p e c t u s

- Title:** UNDP/RCA/IAEA REGIONAL TRAINING COURSE ON FUNDAMENTAL ASPECTS OF RADIATION TECHNOLOGY AND ENVIRONMENTAL APPLICATIONS
- Place:** Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, Takasaki, Japan.
- Date:** 6 - 17 June 1994
- Deadline for nominations:** 31 March 1994
- Organizers:** The Government of Japan through the Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute in co-operation with the International Atomic Energy Agency.
- Language:** English.
- Participation:** The training course is open to 15 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the course:** The purpose of the course is to provide training in basic radiation chemistry and technology for personnel involved in:
- radiation research, applied radiation chemistry and research;
  - teaching of radiation and photochemistry at universities;
  - research in radiation biology and biological sciences;
  - research in food irradiation chemistry;
  - industrial applications of radiation chemistry and technology;
  - technology transfer and development of radiation applications.
- Participants' qualifications:** Candidates should have a university degree in chemistry, chemical engineering, nuclear engineering, biochemistry or related fields. Experience and understanding of basic principles of physics, radiation physics and radiation science is required.
- Nature of the course:** The course will consist of: lectures, classroom exercises, laboratory exercises; visits to laboratories and industrial facilities; discussion periods; tests, and examinations.
- A final examination will be held at the end of the course. Satisfactory pursuance of the course and results of examination will qualify participants to receive a certificate

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 March 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of Japan will, out of its contribution to RCA, pay the costs of the participants' air travel from their home countries to Japan and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

## P r o s p e c t u s

**Title:** UNDP/RCA/IAEA REGIONAL TRAINING COURSE ON RADIATION STERILIZATION-VALIDATION, ROUTINE CONTROL AND APPLICATION OF ISO STANDARD

**Place:** Office of Atomic Energy for Peace, Bangkok, Thailand.

**Date:** 4 - 15 July 1994

**Deadline for nominations:** 15 April 1994

**Organizers:** The International Atomic Energy Agency in co-operation with the Government of Thailand through the Office of Atomic Energy for Peace.

**Language:** English.

**Participation:** The training course is open to 15 participants from developing RCA Member States in the Asia and Pacific region.

**Purpose of the course:** The purpose of the course is to review and explain the present status of industrial sterilization of health care products with emphasis on radiation sterilization, the process validation and the current development of international standards, regulations and guidelines; to explain the main principles of: international standards (ISO, EC) on industrial sterilization; dose setting procedures in radiation sterilization; quality assurance systems and management. A further purpose is to promote the development of national standards and regulations (based on the ISO standards).

**Participants' qualifications:** Candidates should have a university degree in science or engineering, and preferably be involved in manufacture of medical products or industrial radiation sterilization, with responsibilities for process and quality control; or, being involved in regulations, inspection and control of industrial sterilization. Candidates should provide evidence of being engaged in manufacture of health care products, sterilization, regulations and control, or being presently or, in near future, involved in industrial projects.

**Programme of the course:** The programme for the training course will include theoretical and practical aspects of industrial radiation sterilization of medical products with emphasis on main elements of manufacture (Good Manufacturing Practice-GMP) and irradiation (Good Radiation Practice-GRP), on regulations and standards for process evaluation. The course will be based on the Agency (IAEA) Guidelines for radiation sterilization and on the latest version of ISO (International Standards Organization) standard for sterilization of health care products-requirements for validation and routine control, ISO/DIS/11137.2 (including: process validation, process control, dose setting methods/procedures and dosimetry).

The programme will be delivered through lectures, classroom and laboratory exercises. A visit to an industrial radiation sterilization facility is foreseen. An examination will be held at different stages of course duration and at the end of the course.

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 April 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will defray the costs of the participants' air travel from their home countries to Bangkok and return, and will provide them with a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

## P r o s p e c t u s

- Title:** UNDP/RCA/IAEA REGIONAL SEMINAR ON ELECTRON BEAM TECHNOLOGY FOR PURIFICATION OF FLUE GASES
- Place:** Takasaki Radiation Chemistry Research Establishment, Japan  
Atomic Energy Research Institute, Takasaki, Japan
- Date:** 17 - 21 October 1994
- Deadline for nominations:** 30 June 1994
- Organizers:** The Government of Japan through the Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute in co-operation with the International Atomic Energy Agency.
- Language:** The language of instruction will be English.
- Participation:** The seminar is open to 15 participants from developing RCA Member States in the Asia and Pacific region.
- Background and introduction:** Electron beam (EB) processing of combustion flue gases from electric and thermal power plants burning coal or oil has been demonstrated as a technically and economically competitive technology, the main benefit being pollution control and conservation of the environment. The product of the process is clean flue gas free of toxic components (SO<sub>2</sub> and NO<sub>x</sub>) and a solid material useful as an agricultural fertilizer. The technology is particularly applicable to small and medium size power plants. It is a simple and reliable process appropriate for consideration in developing countries.
- Purpose of the seminar:** The main purpose of the seminar is to exchange information about the actual environmental problems due to emission of flue gases in RCA developing Member States and to provide information about the potential application of EB processing to solve them.
- Participants' qualifications:** Candidates should have a university degree and experience relevant to the subject of the seminar. Preferably, the candidates should have (management) responsibilities for operation of power plants and environmental aspects, or be involved in Government (regulatory) authorities concerned with conservation of the environment.
- Nature of the seminar:** The seminar will consist of lectures and practical exercises, as well as technical visits to facilities in Japan.
- The topics of the seminar will include:
- fundamental principles of EB processing of flue gases
  - EB sources and technology
  - radiation safety aspects
  - economic aspects (capital cost and operational cost)
  - description of existing facilities and new projects
  - visits to research and demonstration facilities in Japan

- review of environmental problems and actions in participating countries (reports by participants).

A tentative programme of the seminar is attached.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 30 June 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the seminar is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of Japan will, out of its special contribution to RCA, pay the costs of the participants' air travel from their home countries to Japan and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the seminar do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the seminar and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.



## P r o s p e c t u s

- Title:** UNDP/RCA/IAEA REGIONAL SEMINAR ON RADIATION TECHNOLOGY FOR BIOMEDICAL APPLICATIONS
- Place:** University House, Shanghai University of Science and Technology, Shanghai, China
- Date:** 12 - 16 December 1994
- Deadline for nominations:** 31 August 1994
- Organizers:** The Government of China through the Shanghai University of Science and Technology, in co-operation with the International Atomic Energy Agency.
- Language:** The language of instruction will be English.
- Participation:** The seminar is open to 15 participants from developing RCA Member States in the Asia and Pacific region.
- Background and introduction:** Radiation technology (radiation processing) has been demonstrated on laboratory and industrial scale as a powerful tool for preparation of different biomaterials, for example artificial skin, soft contact lenses and wound dressings are now produced commercially. A new class of materials - hydrogels - can be reliably synthesized by radiation technique including hydrogels with special properties such as thermal sensitivity and pH sensitivity. A number of biofunctional materials can be immobilized by radiation, and the resultant material used for diagnostic or therapeutic purposes. A biocompatible surface can be produced by radiation grafting of a suitable material on many types of substrates. These are only a few of the new developments and the technology has the potential for a large variety of industrial and medical applications.
- Purpose of the seminar:** The two main purposes of the seminar are to disseminate information about this new application of radiation technology with the intent of stimulating and initiating research and development programmes for radiation synthesis of biomaterials; biocompatible materials; immobilized drugs for slow and controlled release; immobilized bioactive materials for early diagnosis of disease, for therapy, etc. and to analyse the technical and economic benefits and problems. The long term goal is improvement of medical treatment in the countries of the Asia and Pacific region.
- Participants' qualifications:** Candidates should have a university degree in physics, chemistry, chemical engineering, or related fields. Preference will be given to candidates who have previous experience and interest in radiation chemistry, radiation technology, radiation preparation of biomaterials or direct responsibility for development of biomaterials. Medical scientists or bio-scientists (biology, biochemistry, microbiology, etc.) interested in development and use of biomedical materials, slow release drug systems, artificial organs, diagnostic devices, etc., are encouraged to participate. Some previous experience is desirable.

Nature of the seminar:

The seminar will consist of lectures and discussion periods and, if necessary, tutorials.

The main topics of the seminar are:

- fundamentals of radiation chemistry and physics relevant to the subject;
- radiation sources used in radiation processing (engineering, safety, economics, etc.);
- radiation grafting and modification of surfaces (biocompatibility);
- physical immobilization of bioactive materials;
- chemical immobilization of bioactive materials;
- synthesis of hydrogels and applications;
- special types of hydrogels;
- diagnostic devices;
- artificial organs, etc.

An outline of the programme is attached.

Application procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 August 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the seminar is spoken.

Administrative and financial arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of China will, out of its contribution to RCA, pay the costs of the participants' air travel from their home countries to Shanghai and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

## P r o s p e c t u s

- Title: UNDP/RCA/IAEA REGIONAL WORKSHOP ON RADIATION PROCESSING IN INDUSTRY - PROCESS CONTROL AND DOSIMETRY
- Place: Takasaki, Japan
- Date: 19 - 23 December 1994
- Deadline for nominations: 31 August 1994
- Organizers: The Government of Japan, through the Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, in co-operation with the International Atomic Energy Agency.
- Language: The language of instruction will be English.
- Participation: The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region.
- Background and introduction: The workshop is part of the UNDP/RCA/IAEA project for Asia and the Pacific on "the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development", RAS/92/073. which is carried out by the International Atomic Energy Agency in cooperation with participating Governments in the Asia and Pacific region.
- Purpose of the workshop: The main purpose of the workshop is to discuss and review standard practices of process control in industrial applications of radiation processing (gamma radiation and electron beams) in RCA countries.
- Further purposes of the workshop are:
- to provide information about the current practices, and regulations in particular, concerning the process control and dosimetry;
  - to discuss modalities and possible mechanism for regional cooperation in standardization and calibration of routine process dosimeters;
  - to discuss the training programmes in accordance with international standards for dosimetry and requirements for process control.
- Participants' qualifications: Candidates should have background in radiation sciences and dosimetry. They should have the responsibility for process control and dosimetry in industrial or pilot radiation facilities.
- Nature of the workshop: The workshop consists of presentations by invited speakers, and participants, followed by discussion periods. A demonstration of the most common dosimetry techniques will be included.

The topics of the workshop include:

- gamma and electron beam irradiation
- applications such as sterilization of medical products
- food irradiation
- processing of polymers.

A tentative programme of the workshop is attached.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 August 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of Japan will, out of its special contribution to RCA, pay the costs of the participants' air travel from their home countries to Japan and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

**Project Title and Number: The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development (RAS/92/073)**

**Project Description:** The project is a co-operative venture between RCA Member States designed to maximize effective transfer of technology, in order to achieve self sufficiency and realize establishment of the technology with appropriate industries, utilities and other end-users. The project encompasses radiation processing, tracers techniques and nucleonic control systems applied to industrial processes, nuclear analytical techniques and non-destructive testing and evaluation. The technology transfer is implemented through expert missions, training courses, workshops, and field experiments and demonstrations.

**Participating Member States:** Australia, Bangladesh, China, India, Indonesia, Japan, New Zealand, Republic of Korea, Malaysia, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Viet Nam.

**Project Officer:** I. Lewkowicz

**Major Activities and Achievements in 1994**

1. National Counterparts meeting and tripartite review has been held in Australia (31 March to 4 April).
2. Regional Training Course on Application of Isotope Techniques in Process Optimization with the objective of furnishing theoretical knowledge and practical training in the application of radioisotope technique for process investigation and scale-up has been held on 7-25 November in India. Thirteen participants from nine Member States benefited from the course. Some specific problems or questions of the participants have been solved together during the round table discussions.
3. ....

**Time-table for Planned Activities in 1995**

1. Mid-Term Evaluation Mission to China, Republic of Korea, Pakistan, Malaysia, Thailand and Viet Nam. March.
2. 2-nd Meeting of National Co-ordinators - Tracer and NCS, in Sri Lanka 13-17 February.
3. Regional Workshop and Seminar on Nucleonic Control System in Small and Medium Sized Paper Industries. China, May.
4. Regional Workshop on Tracer Techniques in the Study of Dispersion of Effluents in Groundwaters. Viet Nam, October.



## Prospectus

- Title:** UNDP/RCA/IAEA REGIONAL WORKSHOP ON THE USE OF TRACER TECHNOLOGY TO STUDY DISPERSION OF EFFLUENTS IN SURFACE WATERS
- Place:** Nuclear Energy Unit, Ministry of Science, Technology and Environment, Kuala Lumpur, Malaysia
- Date:** 5 - 21 September 1994
- Deadline for nominations:** 15 May 1994
- Organizers:** International Atomic Energy Agency in co-operation with the Government of Malaysia through the Nuclear Energy Unit, Ministry of Science, Technology and Environment
- Language:** English.
- Participation:** The workshop is open to 25 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop:** The purpose of the workshop is to provide participants with detailed background and methodological coverage of the subject to provide overall view on potential role of tracer applications in surface pollution studies as a basis for future national activities that could be undertaken in the RCA countries.
- The following topics will be covered during the workshop:
- environmental problems involved in surface water pollution and required policy issues
  - planning of in-situ tracer experiments
  - methods of data evaluations and models available for this purpose
  - safety aspects and radiation protection measures.
  - demonstration of tracer techniques related to effluent studies.
- Results of case studies will also be presented as an illustration of the techniques.
- Participants' qualifications:** Candidates should be professionals/scientists and be involved in assessment and management of water pollution in surface waters and have direct responsibility both in tracer applications and national environmental assessment and management practices. It is recommended that at least one person from national tracer applications group and one person from national institution responsible for environmental pollution control and management from each RCA developing Member State be nominated for the workshop.
- Nature of the workshop:** The contents of the workshop will include class-room lectures, presentations and computer demonstrations. Subsequent workshop under this project envisaged for the future will include actual field demonstrations of the tracer applications.

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 May 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Kuala Lumpur and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.



## P r o s p e c t u s

- Title:** UNDP/RCA/IAEA REGIONAL TRAINING COURSE ON APPLICATION OF ISOTOPE TECHNIQUES IN PROCESS OPTIMIZATION
- Place:** Bhabha Atomic Research Centre (BARC), Bombay, India
- Date:** 7 - 25 November 1994
- Deadline for nominations:** 31 July 1994
- Organizers:** International Atomic Energy Agency in co-operation with the Government of India through the Bhabha Atomic Research Centre
- Language:** The language of instruction will be English.
- Participation:** The workshop is open to 18 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the course:** The purpose of the training course is to provide the theoretical knowledge and practical training in the application of radioisotope techniques to process investigation on full industrial scale.
- Participants' qualifications:** Candidates should be actively involved in process optimization through National Tracer Groups or as industry staff.
- Nature of the course:** The course will comprise the following topics:
- Plant processes and role of isotope techniques
  - Introduction to radiation detection
  - Radiation protection and safety
  - Introduction to Mathematical modelling of tracer data
  - Design and execution of tracer studies
    - A choice of tracer
    - Measuring equipment
    - Injection and monitoring modes
    - Data acquisition
    - Data analysis
  - Sealed source applications
  - Selected demonstrations in industrial plants (including flow measurements and flow characterisation).

The main emphasis will be on some study cases of radioisotope application for process optimization such as: residence-time distribution, flow measurement, and leak detection. These will be later demonstrated and the results will be evaluated and processed by the candidates, using software available in the region. The conclusions in terms of process parameter changes needed for optimization will be discussed. Sealed sources applications, different type of sources and selection of measurement techniques will be introduced. Nucleonic Systems and their application will be reviewed.

A round-table discussion will be held on selected topics of interest in order to provide a good opportunity for the participants to exchange their views and experiences in approaching specific problems in their respective home countries.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 July 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Bombay and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

1995-01-24

## **DRAFT SUBMISSION FOR RCA ANNUAL REPORT FOR 1994**

**PROJECT TITLE AND NUMBER:** JOINT UNDP/RCA/IAEA PROJECT ON THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN TECHNOLOGY AND SUPPORT ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT: *SUB-PROJECT ON NUCLEAR ANALYTICAL TECHNIQUES* (RAS/92/073)

**Project Description:** Begun in mid-1993, this Sub-Project takes advantage of already-existing nuclear and nuclear-related analytical resources in the region. It aims to promote their application in monitoring and research on toxic heavy metals in the environment with emphasis on environmental problems that are considered to be of importance both nationally and regionally. The main nuclear analytical techniques (NATs) that are being supported are neutron activation analysis (NAA), particle-induced X-ray emission (PIXE) and energy-dispersive X-ray fluorescence analysis (ED-XRF). Priority problem areas include (i) the study of local pollution sources that may have a significant health impact, (2) long range transport (by air and water) of pollutants and identification of pollution sources, (3) baseline data for critical pollutants in selected environmental matrices, and (4) trend monitoring for selected pollutants and matrices. Priority matrices for collection and analysis include (1) airborne particulate matter, (2) sediment and soil, and (3) natural water bodies and biological accumulators (biomonitors). Major themes of the Sub-Project include (1) analytical quality assurance, (2) sampling and sample collection, and (3) data analysis and interpretation. Intended outputs of the project are internationally accepted procedures on nuclear analytical techniques for environmental studies harmonized regionally with at least one representative from each participating Member State trained to the required standards.

**Participating Member States:** Australia, Bangladesh, China, India, Indonesia, Korea, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam

**Project Officer:** R.M. Parr

### **Major Achievements and Activities in 1994**

1. A Workshop on "Environmental and Industrial Applications of Nuclear Analytical Techniques" was held at the Analytical Chemistry Division, BARC, Bombay, India, from 24 January to 11 February 1994. It was attended by fifteen participants from nine countries and two observers from Indian Industry.
2. A Chief Technical Officer, Hien Pham Duy, took up his duties in February 1994. He is based in Jakarta, Indonesia. During 1994 he visited (and in some cases assisted) NAT groups in Australia, Bangladesh, Indonesia, Malaysia, Singapore, Thailand and Vietnam to assess the current status of the project implementation in these countries and to advise on future project activities.
3. Two intercomparison exercises were initiated (1) for total mercury and methyl mercury in human hair, and (2) for multielement studies of three bulk materials which are similar in composition and particle size distribution to airborne dust. (The results of these intercomparisons will be presented and discussed at the Workshop due to be held in Singapore in July 1995 - see next section.)
4. To promote information exchange, a procedure was introduced for the rapid distribution of short news items (of which there were 15 during 1994) to all national

co-ordinators. An extensive collection of relevant Agency publications, other documents and IAEA PC software, was also distributed.

5. A proposal for an RCA Co-ordinated Research Programme on Air Pollution (to be implemented within the framework of this Sub-Project) was endorsed by the 23rd General Conference Meeting of RCA Member States held in Vienna in September. Research proposals were subsequently solicited with a view to initiating the CRP in early 1995. Arrangements were also made to provide the participants with an air sampler of a standard design (a low volume air sampler comprising stacked filter units capable of providing separation of airborne particulate matter into two size ranges below 10  $\mu\text{m}$ ).

#### **Planned Activities for 1995**

1. Meeting of National Co-ordinators in Lucas Heights, Australia, 20-24 February 1995 combined with an Expert Workshop on application of ISO-25 and other relevant international standards.
2. Workshop on Nuclear Analytical Techniques in Environmental Research and Monitoring, Singapore, 3-7 July 1995.
3. RCA Co-ordinated Research Programme on Air Pollution (see item 5 above).
4. Group fellowship training in the application of neutron activation analysis (NAA) to air pollution studies (depending on availability of funding).
5. Expert services for 3-4 national seminars and other related activities (depending on availability of funding).

## P r o s p e c t u s

- Title:** UNDP/RCA/IAEA REGIONAL WORKSHOP ON ENVIRONMENTAL AND INDUSTRIAL APPLICATIONS OF NUCLEAR ANALYTICAL TECHNIQUES
- Place:** Bhabha Atomic Research Centre (BARC), Trombay, Bombay, India.
- Date:** 24 January - 11 February 1994
- Deadline for nominations:** 15 October 1993.
- Organizers:** The Government of India through the Bhabha Atomic Research Centre, in co-operation with the International Atomic Energy Agency.
- Language:** English.
- Participation:** The workshop is open to 14 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop:** Nuclear and nuclear-related analytical techniques (NATs) such as neutron activation analysis (using a research nuclear reactor, neutron generator or isotopic neutron source), X-ray fluorescence analysis, and ion beam analysis (e.g. PIXE) play an increasingly important role in environmental pollution control, industrial analysis and mineral exploration. Potentially they have important applications in manufacturing industries such as basic metals, chemicals, oil, coal and steel. In environmental pollution control they are particularly useful as validation support to programmes using other, non-nuclear, analytical techniques.
- The purpose of the workshop is to create enhanced awareness of the potential of various NATs in different environmental and industrial application areas. The workshop is expected to be of interest to programme managers and scientists who are working in one of the above-mentioned areas and who otherwise do not yet have detailed familiarity with these techniques.
- Participants' qualifications:** Participants are expected to be "work-bench" scientists who have direct responsibility for carrying out actual analyses in any of the fields mentioned above, and who also have, or expect to gain, access to one of the nuclear analytical techniques under consideration. They should have a Bachelor's degree or equivalent in physics, chemistry or technology. About two years' experience in environmental and/or industrial analysis or quality control, and/or familiarity with any one of the nuclear analytical techniques listed above, is desirable but not essential.
- Nature of the workshop:** Participants will attend the workshop for the period 24 January - 11 February 1994. During the 2-weeks (24 January - 4 February) they will attend a training course at the Bhabha Atomic Research Centre, Bombay. This will consist of class room lectures dealing with basic principles of NATs and their applications in the specific areas mentioned above.

These lectures will be supplemented by demonstrations and "hands on" experiments and field visits. In the third week they will attend the 3-day International Conference on Applications of Radioisotopes and Radiation for Industrial Development (ICARID-94) which will be organized in co-operation with IAEA in Bombay, 7 - 9 February 1994. Following this, they will attend a 2-day special seminar (10 - 11 February) designed to create enhanced awareness of the applications of (NATs) in the subject areas of: (i) control or monitoring of industrial emissions and effluents, (ii) optimization of industrial processes to reduce environmental pollution, and (iii) occupational hygiene and/or environmental health.

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned together with questionnaire through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 October 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

A copy of the nomination form together with the attached completed Personal Data Sheet and questionnaire should also be sent to the Workshop Director at the address given below:

Dr. S. Gangadharan  
Head, Analytical Chemistry Division  
Bhabha Atomic Research Centre (BARC)  
Trombay  
Bombay 400 085  
India

Telex: 011-71017 BARC IN  
Phone: (91) 22-556 3060  
Fax: (91) 22-556 0750

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

Participants will be provided with air travel from their home countries to Bombay and return, and will be paid a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept, liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.





Project Title and Number: Non-destructive evaluation (RAS/92/073)

Project Description: The project is a co-operative venture between RCA Member States designed to strengthen the capability of participating countries in the field of non-destructive testing and evaluation with special emphasis on training, qualification and certification of NDT personnel.

Participating Member States: Australia, Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Pakistan Philippines, Singapore, Sri Lanka, Thailand, Vietnam, Japan.

Technical Officer: B. Zatolokin

Major Activities and Achievements in 1993: 1. Regional training course on industrial application of non-destructive testing and evaluation, Rep. of Korea, 30 June-21 July 1994.

Time-table for Planned Activities in 1995: 1. Regional Workshop on the Fabrication of NDT Test Pieces, Malaysia, 16-27 January 1995.  
2. Regional Seminar on the Evaluation of NDT Test Pieces, Malaysia, 23-17 January 1995.

doc1.B.Zatolokin



## P r o s p e c t u s

Title: REGIONAL (RCA) TRAINING COURSE ON INDUSTRIAL APPLICATION OF NON-DESTRUCTIVE TESTING AND EVALUATION

Place: Nuclear Training Center, Korea Atomic Energy Research Institute, Daejeon, Republic of Korea

Date: 30 June - 21 July 1994

Deadline for nominations: 15 April 1994

Organizers: The Government of the Republic of Korea, through the Korea Atomic Energy Research Institute (KAERI) in co-operation with the Korea International Cooperation Agency (KOICA) and the International Atomic Energy Agency.

Language: English.

Participation: The training course is open to 20 participants from developing RCA Member States in the Asia and Pacific region.

Purpose of the course: The purpose of the course is to provide participants in the RCA developing Member States where NDT technology is widely used in nuclear power plant and other industries, with the knowledge and the experience of non-destructive inspection of nuclear power plants.

Participants' qualifications: Participants should have a university degree or diploma in an appropriate field, such as engineering or science, and a minimum of two years' experience in non-destructive testing.

Candidates must have at least level 2 certificate(s) in any NDT methods obtained from a national certification scheme or internationally known qualification scheme such as ASNT-SNT-TC-IA draft DIS 9712, or UNDP/IAEA/RCA regional training course.

Nature of the course: The training course will consist of lectures, panel discussions, small group workshops and demonstrations in various inspection methods. A scientific visit to a nuclear power plant will also be included.

Outline of the course: The following subjects will be covered:

- Introduction to industrial application of NDT and evaluation
- Metallurgy and welding
- Ultrasonic testing
- Eddy current testing
- Magnetic particle testing
- Liquid penetrant testing
- Radiographic testing
- Acoustic emission testing
- Visual inspection
- Leak testing
- Neutron radiographic testing
- Case study on industrial application of NDT and evaluation
- Site lectures and technical visit

Application  
procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 April 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

A copy of the nomination form should also be sent to the Host Institute at the address given below:

Korea Atomic Energy Research Institute (KAERI)  
P.O. Box 7  
Daeduk-Danji, Daejeon  
Republic of Korea

Telex: 45553 K  
Phone: 42-868-2151  
Fax: 42-861-7468

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the course is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The Government of the Republic of Korea will, out of its contribution to RCA, pay the costs of the participants' air travel from their home countries to Seoul and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the training course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

## P r o s p e c t u s

- Title:** UNDP/IAEA/RCA REGIONAL WORKSHOP ON THE APPLICATION OF NUCLEONIC CONTROL SYSTEMS TO COAL PROCESSING OPERATIONS
- Place:** Mae Moh, Lampang, Thailand
- Date:** 28 November - 9 December 1994
- Deadline for nominations:** 10 September 1994
- Organizers:** International Atomic Energy Agency and the United Nations Development Programme in co-operation with the Government of Australia, through the Australian Nuclear Science and Technology Organisation (ANSTO).
- The workshop is hosted by the Government of Thailand through the Office of Atomic Energy for Peace (OAEP) and the Electricity Generating Authority of Thailand (EGAT).
- Language:** The language of instruction will be English.
- Participation:** The workshop is open to 25 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop:** The purpose of the workshop is to provide training in:
- nuclear science theory as applied to the coal industry
  - the operation, maintenance and utilization of nucleonic ash gauges.
- Participants' qualifications:** Candidates should have a university degree in minerals or coal processing, physics, electrical engineering or instrument engineering. They should be currently involved in the operation, design or planning of either coal preparation plants or instruments for use in such plants.
- Outline of the workshop:** The workshop will cover both the theoretical and practical aspects of the use of nucleonic ash measuring systems in industrial operations. The workshop is aimed at training engineers and scientists who will install and operate ash gauges in a production environment, and who will have the responsibility for ensuring that the control system is achieving its objective.
- The workshop will consist of:
- Lectures on nuclear science and technology, with particular emphasis on applications in the coal industry
  - lectures and demonstrations on the operation and maintenance of the ash gauge, and its use in improving plant operating performance
  - practical training on an operating ash gauge
  - tutorials and panel discussions during which each candidate will be invited to discuss the applications of ash gauges to a coal processing operation with which they are familiar in their own countries.

Application  
procedure:

Nominations should be submitted on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 10 September 1994. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA make preliminary evaluation of the candidates.

Please note that a copy of the nomination forms, should also be sent to the Workshop Director:

Dr. Peter Airey  
Australian Nuclear Science  
and Technology Organisation  
Lucas Heights Research Laboratories  
New Illawarra Road  
Lucas Heights NSW / Australia

Telex: AA24562  
Phone: 61-2-7173272  
Fax: 61-2-7179293

Language  
certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the workshop is spoken.

Administrative  
and financial  
arrangements:

Nominating Governments will be informed in due course of the names of the selected candidates and at that time will be given full details of the procedures to be followed with regard to administrative and financial arrangements.

The IAEA will pay the costs of the participants' air travel from their home countries to Thailand and return, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the workshop do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the workshop and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments should be well advised to take out insurance against these risks.

# **KEEPING PACE WITH CHANGE - THE REGIONAL COOPERATIVE AGREEMENT (RCA) FOR ASIA AND THE PACIFIC**

**Dr John F Easey  
RCA Coordinator  
International Atomic Energy Agency  
Vienna**

## **1. WHAT IS THE REGIONAL CO-OPERATIVE AGREEMENT (RCA) FOR ASIA AND THE PACIFIC AND WHICH COUNTRIES ARE INVOLVED**

The Regional Co-operative Agreement (RCA) for Research, Development and Training Related to Nuclear Science Technology (RCA) is an intergovernmental agreement which was first brought into force for a five year period on 12th June 1972. The participating governments subsequently extended the agreement for two further five year terms in 1977 and 1982. In 1987 a modified agreement was negotiated, again for a five year project, and this was extended for a further five years in 1992. As of 1st August 1994 there were seventeen Government signatories to the current extension: Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

The agreement extension process involving representation, reconsideration and recommitment every five years at a senior level by governments may assist in maintaining the vigour of the RCA through focussing their evaluation on the worth and benefits of membership which includes consideration and assessment of their obligations and ability to make such commitments.

The parties to the RCA, the RCA Member States, undertake, in co-operation with each other and the International Atomic Energy Agency (IAEA), to promote and co-ordinate co-operative research, development and training projects in nuclear science and technology through their appropriate national institutions. This is a

recognition of the existence of areas of common interest for Member States, within their national atomic energy programmes, where mutual co-operation can promote the more efficient utilization of available resources.

The function of the IAEA within the framework of the Agreement is to : perform the secretariat duties required under the Agreement; to support the co-operative projects through technical assistance and other IAEA programmes as resources allow; to administer the project funds; and, to prepare an annual report. The IAEA is not a signatory to the RCA.

## 2. **PROGRAMME DESIGN AND DECISION MAKING IN THE RCA PROGRAMME**

The intensity of the involvement of the **government agencies** involved in the RCA has been kept at a high level by ensuring that they have the **major role in the design and approval of the programme as well as monitoring and evaluation.**

It is important to note that the total scope and content of the RCA programme is **determined solely by the Member States by consensus.** The Agreement sets out the mechanisms by which the technical programme can be initiated and also details the obligations of Member States in the review and monitoring of the programme they have established.

The biannual meetings of RCA, to which all participating Member States are invited review the total programme, examining issues such as implementation, progress and priorities and approve new projects. These meetings have and added advantage of providing a forum to enable the **projects to be continually assessed** and, if necessary, **fine tuned to match the evolving needs and priorities** of the Member States as well as **the technical advances and changes.**



To enable the programme to have projects that properly satisfy the regional needs, it is now standard practice to establish the project aims and objectives and detail the activities using project formulation meetings. These are attended by National Counterparts nominated by each Member State wishing to participate in the project. This mechanism has allowed **the formulation and design of these regional projects** to take place in a **democratic and transparent manner**, ensuring that the **benefits are experienced by participating states as widely as possible**. This approach has had major benefits because it has lead to well-planned, well-structured project proposals whose aims, objectives and outputs are clearly spelt out. This has facilitated the management and the monitoring and evaluation of the project.

The **intensive country involvement in planning** the regional and the national components of the programme ensures that **the best and most efficient use of local institutes and personnel** as well as **regional institutes and personnel**. There is a significant contribution to the stimulation and expansion of TCDC activities because of this process.

The **government agencies participating** in the RCA are **the same ones** that are involved in the **national programmes as well as the other regional or sub-regional programmes** being addressed through **other multilateral or bilateral arrangements**. It is axiomatic that this multiple role ensures the establishment of the contacts necessary for facilitating convergent approaches and action.

### 3. **FUNDING OF THE RCA PROGRAMME**

Donor funding has been an important factor in securing adequate financial resources to enable the programme proposed by the Member States to be implemented. RCA is exceptional because of the high level of extrabudgetary support it has attracted. Currently, two thirds of the approximately US3 million

annual budget is financed from these extrabudgetary sources, with the remaining one third of "seed funding" coming from the IAEA. The major extrabudgetary donors are UNDP and the Governments of Australia and Japan. However, these are not the only sources of extrabudgetary or project support. There has been a growing recognition by Member States of the maturing of RCA and with it, the need to begin to assume more of the financial burden of the programme. In 1994, as well as the training courses financially supported by the Governments of China, India and the Republic of Korea, future extrabudgetary cash support to be made by the Governments of China, India, Indonesia, Republic of Korea, Malaysia, New Zealand, Philippines and Thailand could exceed US\$250,000 annually.

In addition to the cash budget, there is an extensive "in kind" budget covering the local costs for the programme which are provided by the National Governments to support the various project activities. Such support ranges over many aspects from providing the support cost for implementing regional events hosted in their country, through to the provision of cost free experts and facilities for project use, to the provision of facilities and support for long-term project staff stationed in the region. Although these "in kind" contributions are not quantified in terms of their actual cost, the contribution and magnitude of the support, in terms of facilitating the programme, is extremely significant.

The Agreement and the underpinning financial commitments are important preconditions for productive and useful projects but **the practical functioning of the programme requires more than words and money, and the success of RCA has only been possible because Member States have strongly backed it at all levels.** The first and most important factor has been the high quality of the people selected by the Member States to participate in the programme especially those designated to be the counterparts. Extensive use is made of the networks of national counterparts and they are the information interfaces between IAEA and their national activities. The importance of their role has been noted on many

occasions and Member States have responded by nominating appropriate, highly experience and capable individuals for these demanding tasks even when those counterparts are outside the AEC machinery.

The smooth functioning of RCA over its 22 years of existence is a testament to the strong collective desire for the Agreement to succeed and the recognition of the positive contribution of the programme to the National programmes through the furthering of these beneficial applications of peaceful uses of nuclear science and technology.

#### 4. WHAT IS THE SHAPE OF THE RCA PROGRAMME?

- The RCA programme developed by its Member States is a **technical programme** based on the **lead subject area of application of nuclear techniques**. The focus areas such as industry, the environment and health pursue the key elements of sustainable human development. The RCA programme has also made a formal commitment establishment of specific emphasis on initiatives that contribute to "Women In Development".
- The RCA programme is clearly based on the priorities of the region and all parties contribute to the development of the strategy for the region within this area as well as the structure of the individual project through the project formulation process.
- The RCA programme is managed by the IAEA through the RCA office.
- The RCA programme has been a focus to mobilize donor funds not only from developed countries but also the developing.

- The basic structure of RCA allows for flexibility, with Member States playing significant roles in the implementation of the programme.
- The RCA programme is clearly seen by the parties involved as a partnership arrangement.

## 5. SUMMARY

The demonstrated commitment of RCA Member States to the ideals of the Agreement and their recognition of the role it can play in actually achieving co-operation and collaboration in nuclear science and technology and providing a wide range of benefits to their countries, has resulted a high standard technical programme that is dynamic, focussed and having a high level of achievement. It is widely perceived that the RCA programme is responsive, relevant, realistic and produces results leading not only to increased donor support but to increased investment both in the public and private sectors.

## **NOTES ON RCA EXPERIENCE OF ICP-5**

**Dr John F. Easey**

**RCA Coordinator**

**International Atomic Energy Agency**

Background documentation on the RCA is given in the paper "keeping pace with change - The Regional Cooperative Agreement (RCA) for Asia and The Pacific".

Before further elaboration, the following points are pertinent :

- RCA was involved in ICP-3 and ICP-4 there was however no smooth transition between ICP-4 and ICP-5. Eventhough all the project proposal documentation had been lodged with UNDP in a timely manner. Extensive communication problems were experienced with UNDP and late UNDP in April 1993 approval for funding did not permit implementation to be started until June 1993.
- It is appropriate to note here that in the preliminary activities leading up to the current Fifth Inter-Country Programme Cycle, RCA Member States, including donors Australia and Japan, made strong representations to UNDP Headquarters and to their Country offices to encourage UNDP support of the RCA project proposal submitted to them for ICP-5. This was another visible demonstration of their high level of support and commitment.
- Donor funding from Australia, Japan and Malaysia was affected by this delay. Although a skeleton bridging programme was carried out, there was a loss of project momentum and this was particularly felt in the project coordination networks.

- RAS/92/073 "The Use Of Isotopes and Radiation To Strengthen Technology and Support Environmentally Sustainable Development" has a total cash budget of US\$6,481,950 of which UNDP's contribution was expected to be \$3.3 million or 51%. Taking into account the 'in kind' contribution the total project budget is US\$8,385,750, reducing the UNDP percentage to 39%.
- The project was seen as a clear partnership arrangement between UNDP, IAEA and the RCA Member States and the agreement of UNDP to provide funds to support the project, as defined in the Project Document, was taken as a commitment for the duration of the project.

Within the context of the funding problems being currently experienced by UNDP the cuts to the 1994 and 1995 budgets must be viewed as regrettable but unavoidable. Their move to deobligate any commitment for the remaining part of this project cannot go unchallenged. In this context the following points are considered relevant :

- 1) - UNDP has found that there were concerns in their Mid Term Review that projects in ICP-5 did not have the technical relevance of depth required by the recipient countries.
  - Project RAS/92/073 is a highly technical project where the specific decision making, monitoring and evaluations is undertaken by the Member States.
- 2) - UNDP is concerned with having high levels of donor support for co-financing.
  - RAS/92/073 has 40 to 50% donor support in its budget.

- 3) - UNDP is concerned with interlinking of the various tiers of interaction.
- RAS/92/073 : through the RCA, each stakeholder (in the form of the national nuclear research institute in the majority of cases) has the information at their country level concerned with the interlinking national, bilateral and multilateral interactions outside of the RCA. The questions of conformity, complementarity and linkage at the regional, sub-regional and country levels are addressed through the mechanism of project formulation meeting, national co-ordinators meetings and the biannual RCA meetings. The emergent programme focusses strongly on common areas of concern for the region but there is no doubt of the interlinks with the national priorities and the projects.
- 4) - UNDP is concerned with programme assistance and focus on common needs.
- RAS/92/073 : through the RCA, Members States are helped to address their common needs by giving them the fora in which to further their integration through either regional or sub-regional association as determined by their preception of their needs and ambitions. In the evolution of the programme, the importance of the creation of regional networks involving national institutions has been recognized and they are now a very strong and highly utilized feature of the programme. This has had a parallel effect in promoting and enhancing TCDC.

As in RAS/92/073, the projects selected by Member States have shown increasing trends to take on tasks, associated with the establishment of common standards and systems and thus assist the process of harmonization in many diverse areas of science and technology. There is

a natural focus on the "common needs" role in the technical areas, which is further supported by the pooling of scientific research and technical expertise, especially through the Co-ordinated Research Programmes.

- 5) - UNDP is concerned with government commitment to the projects.
  - RAS/92/073 : through the RCA, the commitment of governments and the intensity of involvement of their agencies is facilitated by the basic Agreement and enhanced by the democratic and transparent decision making processes, which ensure that there is relevance in the adopted programme to their specific needs and objectives. It is further underpinned by the extensive use of local and regional resources through the interwoven project links into the regions' technical and research resources and the enhancement of TCDC.

In summary the experience of the RCA Member States in their involvement in ICP-5 has not been positive and there is still major frustration and uncertainty surrounding the future. Much of this frustration is compounded by the view of the Member States that they have a very good alignment with UNDP on all their imperatives on regional issues and yet there is no recognition of or compensation of the advanced nature of their programme.



**17-TH RCA WORKING GROUP MEETING, KUALA-LUMPUR**  
**27-30 MARCH 1995**

**Report on 1994 activities of the Joint UNDP/RCA/IAEA Project RAS/92/073**

*Pham D. Hien*  
*Project Chief Technical Officer*

Distinguished delegates!

A draft of the Project Performance Evaluation Report has been distributed to you which presents an account of the implementation of project activities in 1994 with reference to the project outputs and objectives in five technology areas. This material is given to you for your information. In this meeting I would like to brief you a summary of project activities and make some comments.

1994 was the second year of the Joint Project RAS/92/073 and there was a significant growth of project activities. We have 13 regional training events (RTE) with 206 participants from 14 RCA countries. The attached list presents a picture of participants of RTE by country and subject. We have five events in Radiation Technology, three for sub-project Tracers and NCS, two events in NDE and one workshop on industrial and environmental applications of nuclear analytical techniques. The second attached list provides you with a summary of activities in expert assistance. The Project arranged 62 expert missions to RCA developing countries to assist with national events or to help national research groups in acquiring various isotope and radiation technologies. During 1994 the Chief Technical Officer and the two long term experts on NDE and Tracers were appointed. In line with the programme a number of co-ordination meetings were held during the year, e.g. UNDP National Counterparts Meeting (Sydney, April 1994), Tripartite Review Meeting (May 1994 in Sydney and September 1994 in Vienna), National Co-ordinators Meeting (NCM) for sub-projects Radiation Technology, Tracers and NCS and Nuclear Analytical Techniques (Ho Chi Minh City, Colombo and Sydney, respectively).

Now we will have a look into the project related activities in R&D and commercial use of technology in Member States. The one year duration seems to be very short for reviewing these activities, so that in dealing with this task an approach was taken as following. I looked at the reports of National Co-ordinators to the NCMs, end-of-mission reports of short-term and long-term experts and the recent mid-term review report and then compared these with the reports of the previous NCMs held during 1993. Based on these information sources I am confident in a conclusion that there has been an overall growth of applications of isotope and radiation technology in Member States. For example, demand on NDT services has been booming in the last years in the region and NDT

groups in RCA developing countries successfully met this demand. In the field of Tracer Technology national tracer groups were well established in most of RCA developing countries and they are able to carry out field experiments using isotope tracers. Radiation Technology has been successfully commercialised in many RCA developing countries. A number of electron accelerators and electron beam processing facilities were installed and put into operation in China, Malaysia, Indonesia and India.

Thus, a growth of activities in application of isotope and radiation technology occurs in Member States. The problem is to which extent such a growth is attributed to our Joint Project. For some RCA developing countries which have advanced nuclear programmes this question may be still problematic, but for other countries I am quite confident that the significant contribution of our Project can not be ruled out. Even for countries like India, that has an advanced and comprehensive nuclear programme, we can find the fingerprint of our regional Project. For example, India did not have electron beam processing technology until recently when an electron accelerator was commissioned at BARC. Indian scientists are currently starting to promote cross-linking of wire and cables and other electron beam processing technologies.

The above brief account shows a quite high record achieved in 1994 at least in terms of the number of regional as well as national events. You may ask to assess the performance and the effectiveness of our training programme - the major component of the Joint Project - to the development of isotope and radiation technology in developing Member States. The effectiveness of our training activities is depending on many factors: 1) the nomination of right persons to attend the events, 2) the performance of the events and 3) how the trained persons are provided with appropriate conditions to disseminate and apply the knowledge gained through attending regional training courses. I have to admit that it is still difficult to assess these issues. It is the National Counterpart and National Co-ordinators who can make appropriate judgement on how their country is benefited from regional training activities. However, using this opportunity I would like to share with you observations of lecturers of some RTEs held during 1994.

*Prof. Hoffman S., Washington University, a lecturer of the Regional Seminar on Biomedical Applications of Radiation Technology, Shanghai, 12/1994*

"The participants were well selected and were intelligent and each of them seemed to be highly motivated to learn new technologies and to apply new ideas to their own particular situations..."

*Dr. Ooka N., general instructor of the Regional Workshop on NDT Test Pieces, Kuala-Lumpur, 1/1995*

"The Workshop confirmed the importance of selecting suitably trained and experienced welders. While it is appreciated that many factors have to be considered before nomination is accepted by the Agency, there is no doubt that the effectiveness of this type of

workshop depends on the skills of the welders who attend. In this particular workshop a lot of test pieces had to be rejected because they contained unacceptable other defects...".

*Dr. Thynn J., (Czech Republic), a lecturer of the Regional Training Course on Application of Isotope Techniques to Process Optimization, Bombay 11/1994*

"The course was organised very well and also demonstration of tracer application in industry was very well prepared. However, there are two questions, the real interest of participaters and their ability to follow the lectures. There were participaters with very different experience with radiotracer applications. It was difficult to realise how to present lectures so that everybody will understand. I think that it should be convenient to test knowledge of participaters before and after course."

The quoted above opinions of lecturers may draw the attention of Membe States on further improvement of procedures for selecting candidates to participate RTE. IAEA and the Joint Project should consider also further improvement of performance of RTE. I suggest that adequate time should be reserved in every training courses for practical works, discussions and presenting reports by the participants on their research activities on related matters. Besides, some kind of "low key" proficiency test or examination during or after the course is recommended to be conducted.

Distinguished delegates!

With the challenge of budget cut we are facing currently, further improvement of the quality of project activities performance is relevant and seems to be the best way to achieve our goals in the remaining period of the Joint Project. I do hope we will overcome difficulties and will achieve a higher record in 1995 in terms of both quantity and quality of our activities.

Thank you for your attention!



- **New Project Proposal**

Marine Contamination and Transport Phenomena



**Project Title:** Marine Contamination and Transport Phenomena

**Coverage:** All RCA Member States

**Period:** 1996-2000

**Requested Inputs (1996-97):**

	Experts	Training (US\$)	Equipment (US\$)	Sub-contracts (US\$)
1996	4 M/M	50,000	50,000	50,000
1997	4 M/M	50,000	50,000	50,000
1998				
1999	to be determined	approx. (USD 200,000/year)		
2000				

### **Project Strategy and Development Objectives:**

Controlled sustainable development in Asia and the Pacific is strongly coupled to energy and the environment. Japan, Korea and India all derive a significant fraction of their energy resources from nuclear power production. Several other countries have one or more nuclear power plants or are actively considering developing a nuclear industry. Furthermore, dumping of radioactive waste in regional waters has focused environmental concerns on the potential impact of radioactivity on important marine and coastal resources.

In order to provide a platform for environmentally sound and sustainable development in the field of nuclear science and technology, the growing concerns over environmental radioactivity and protection of coastal and marine resources need to be addressed at a regional level. There is a general lack of environmental data on present levels and sources of anthropogenic radionuclides which could be used to rationally gauge future changes that may occur in the region. This information is essential to provide public reassurance and to evaluate exposure pathways, either of the population as a whole or within critical groups - present or future. Past and present waste disposal practices also pose unanswered problems for the region.

The objectives and development criteria of the present project proposal can be broadly categorized as both radionuclide monitoring and assessments, and man-power development. The new project would utilize much of the investments in skills,

equipment and techniques developed under RAS/8/065 (1990-1994). As such, it will be possible to focus project resources on data acquisition and associated research and monitoring activities. Data on radionuclide levels, distributions and transfers in sea water, sediment and biota will be compared between regional seas. These areas have been variously affected by radionuclide inputs from different sources (waste effluent discharges, dumping operations, river runoff, inputs from adjoining seas and oceans, direct fallout from weapon testing, etc.) There has been no previous systematic study to identify existent levels, sources or transfers of radionuclides through the region.

In general, the marginal seas of SE Asia are unique in terms of their complexity of environments - shallow waters, high suspended loads, high tidal ranges, strong seasonal effects of monsoons and other climatic phenomena, large river inputs, etc. - and they support some of the world's largest fisheries resources and human population base between two major oceans. Conditions controlling transfer along environment pathways which operate in other regions may not be applicable in SE Asia and independent studies should therefore be conducted. The research component should provide an understanding of the mechanisms and fluxes governing transfer along environment pathways.

Monitoring or field measurement programmes should be conducted in order to satisfy several objectives:-

- (i) to establish baseline or pre-operational conditions for future nuclear power reactors
- (ii) to provide public reassurance about potential contamination
- (iii) to follow long-term trends in contaminant levels
- (iv) to evaluate radiological exposure to the local populations
- (v) to demonstrate compliance with statutory limits and practices.

Man-power and resources development should encompass training in sampling methodologies and measurement techniques for key anthropogenic radionuclides and associated contaminants. The procurement of minor, essential items of equipment and the awarding of subcontracts to help offset costs of field sample collection and analytical work are considered essential.

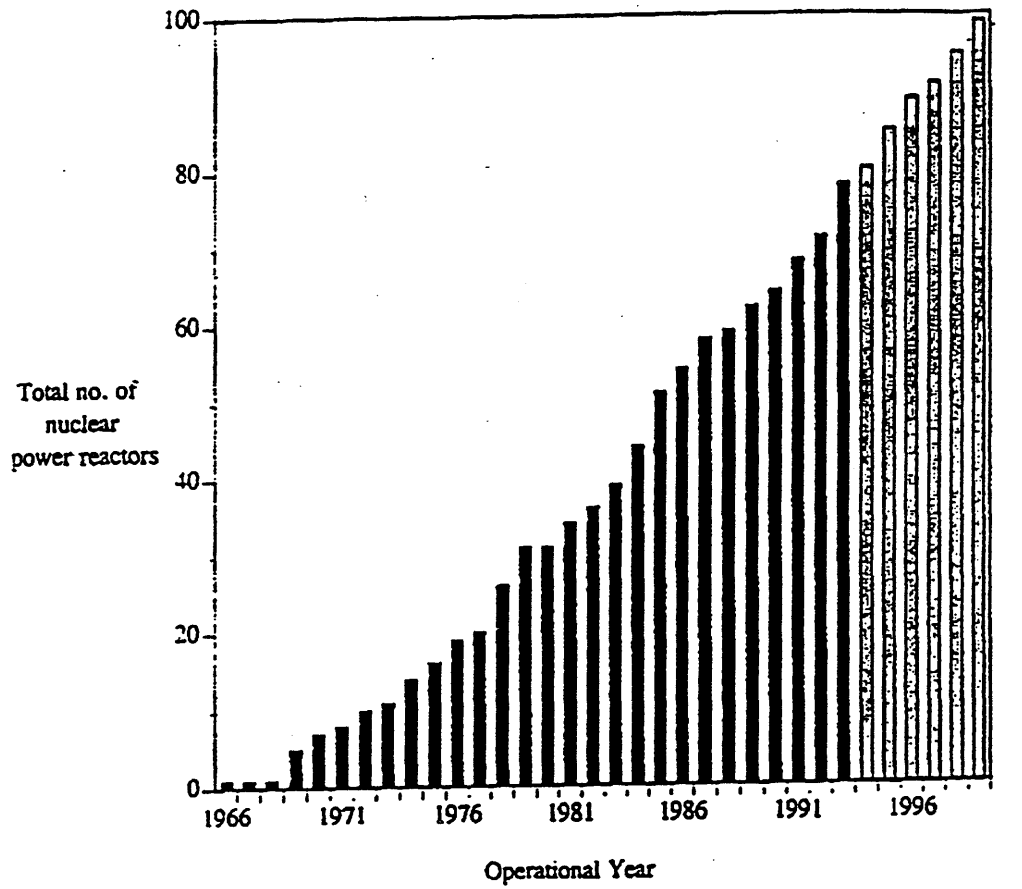
## PROJECT FORMULATION

### 1. Introduction

Radioactivity in the environment continues to evoke public concern and scientific interest. As a consequence, there is an ever increasing need for laboratories to develop and standardize techniques for measuring a wide range of naturally-occurring and artificial radionuclides.

The Asian region obtains a substantial amount of its electrical power requirements from nuclear energy. Some 30% of the world's nuclear power plants are now under construction in the region and it is expected that there will be nearly 100 nuclear power reactors in operation by the year 2000 (Fig. 1.) These facts alone necessitate having a





SOURCE: American Nuclear Society  
'Nuclear News'

Figure 1. Cumulative number of commercial nuclear power reactors either in operation (1966-1993) or expected to be in operation (1994-2000) within RCA Member States (note: data includes Taiwanese reactors).

fundamental knowledge of present baseline levels of natural and artificial radionuclides, so one can rationally gauge future changes that may occur in the region.

In addition to the growth of nuclear power production in the Asian region, environmental concerns are also focused on dumping of radioactive wastes in the regional waters by Russia and the former USSR. Release from wastes dumped in the sea could reach coastal waters in this region and result in transboundary exposure to local populations. In order to detect and quantify any changes related to such dumping operations or from other accidents, a sound knowledge of existent levels of radionuclides in water, sediment and biota is essential.

To obtain this background information, it is proposed to undertake a broad baseline study in the RCA region which will include surveys of key anthropogenic and naturally-occurring radionuclides in coastal waters, sediments and biota. Another primary goal is to derive existent levels of these radionuclides with which radiological assessment models can be developed. For dose assessment, this will require understanding of the critical pathways and processes by which these contaminants may be transferred to people.

## 2. Project aims and objectives

- a. To develop capabilities of scientists in the region to accurately measure low levels of anthropogenic radionuclides, e.g. Pu isotopes, Cs isotopes and  $^{90}\text{Sr}$  in sea water, suspended particulate matter, sediments and biota.
- b. To identify, quantify and map regional levels of key anthropogenic (e.g. Pu isotopes, Cs isotopes,  $^{90}\text{Sr}$ ) and naturally-occurring radionuclides (e.g.  $^{210}\text{Po}$ ,  $^{210}\text{Pb}$  and Ra isotopes) in the marine environment.
- c. To complete an initial radiological dose assessment from marine radioactivity, either of the population as a whole (national and/or regional level) or within defined critical groups.
- d. To develop suitable circulation and mass-transfer models for selected target areas of regional concern, such as: Gulf of Thailand, Straits of Malacca and Java Sea. Assess use of tritium or other conservative tracers of water circulation as a tool for model verification.
- e. To identify and quantify major transport pathways, fates and fluxes of radionuclides and associated contaminants in the marine ecosystem.
- f. A long term goal of the project should be aimed at eventual development of suitable guidelines for emergency response planning in case of accidents involving radioactive materials.

### 3. Implementation Plan

The IAEA Regional Asian Programme on 'Marine Contaminant and Sediment Transport (RAS/8/065)' has helped scientists from several Asian nations to acquire and setup counting equipment, learn laboratory and field sampling techniques and perform numerous analyses of natural series radionuclides ( $^{210}\text{Po}$ , U and Th isotopes). With the experience and confidence gained through RAS/8/065, regional scientists are now ready to learn more advanced techniques for measuring lower activities of artificial radionuclides. This work will involve collecting and processing large volume water samples to measure radionuclides in both particulate and dissolved phases.

During the initial phase of the project, IAEA will help equip participating nations with similar sea water sampling systems consisting of on-line pumps, filters and impregnated sorbant cartridges which allow collection of dissolved and particulate radionuclides in large volumes of sea water (300-500 L.) Expert services will be used to help regional laboratories learn to use the sampling equipment and perform any subsequent analyses for artificial radionuclides (e.g. Pu isotopes, Cs isotopes and  $^{90}\text{Sr}$ ). It will be especially important to collect replicate samples and make careful intercomparisons to ensure that results from different countries are accurate and comparable before embarking on any major field sampling programmes.

A summary of the proposed implementation plan for the 1996-97 period is shown in Table 1.

The project will be initiated during a Project Coordinators Meeting and Workshop (first quarter 1996). Representatives from each nation will be asked to present the following information:-

1. Give an overview of interests, topics of national concern, related programmes, proposed contribution to project, etc.
2. Compile all available radionuclide data from the region.
3. Provide a data synopsis and identify any information gaps.

The workshop component of this initial meeting will be used to clarify data needs to meet the overall project objectives. Experts will be invited to give keynote lectures on radionuclide methodologies, radiological assessments and modeling. Output from the meeting will include a detailed activity workplan for the project, agreement on conducting possible joint sampling cruises or collaborative studies, and planning for the intercomparison exercise.

Project Coordination Meetings should be held on an annual basis. For 1997, the meeting could be combined with a sampling expedition where all participants use the sampling equipment supplied by IAEA, and gain some initial field experience by collecting and analyzing real samples from the region.

Another essential development objective of the project proposal deals with model simulations and emergency response planning. It will not always be possible to rely on field observations in an emergency. Computer models are extremely useful tools which

Table 1 Proposed Project Schedule (period 1996-97).

Year	Resource Component	Task/Implementation
1996	Experts	Initial training in radionuclide methodologies, dose assessments and dispersion modeling.
		Attendance at Project Coordinators Meeting.
	Training	Project Coordinators Meeting (PCM) and Workshop (all RCA Member States, invited experts and IAEA staff). Host country nomination - MINT.
	Equipment	Purchase of sampling equipment for collecting large volume water samples. Distribution of associated tracers and other essential supplies (e.g. $^{134}\text{Cs}$ , $^{90}\text{Sr}$ ).
	Sub-Contracts	Technical Contract offered to host of initial PCM. Initial contract offered to selected countries to help offset costs of establishing work programmes. Technical Contracts for specific tasks (e.g. tritium measurements).
1997	Experts	Training and participation in field sampling expeditions.
		Attendance at Project Coordinators Meeting.
	Training	Project Coordinators Meeting and Sampling Expedition (active PCA Member States, invited experts and IAEA staff). Project Host -KORDI (Korea, Republic of) on board R/V Onnuri, (7-10 days).
	Equipment	Provision of counting equipment and related supplies for field work. Supplies for RCM and sampling expedition.
	Sub-Contracts	Technical contract offered to KORDI to provide vessel for the PCM and sampling expedition. Contracts for specific tasks and data needs.
1998-2000	to be formulated.	

can simulate physical, biological and chemical processes. Circulation models can be used to estimate water circulation patterns under prescribed physical forcing. Dispersion or Mass-Transport Models simulate dispersion of pollutants and their input-output transport functions. For simulation of water pollution processes a combination of both Circulation and Mass-Transport Models are used.

As an example, Fig. 2. shows the output from a numerical model simulation of dispersion of a pollutant near the Siberian Coast. A three-dimensional Circulation-Mass Transport Model was used and shows the concentration of a conservative pollutant in the surface water after 30 days using a  $7 \text{ m s}^{-1}$  north westerly wind. This type of information is potentially very valuable in assessing the possible consequences of long-term point source discharges (e.g. river runoff, effluent discharge point, etc.) or dispersion in the case of a major accident. The models could be used for simulation of dispersion of radioactive as well as non-radioactive pollutants. Simulated case studies will understandably be of great interest to all RCA Member States. Modeling will be introduced into the work programmes of regional laboratories (during the course of the project) as the need and resources allow.

#### 4. Problems and Limitations

1. Cost of conducting oceanographic sampling cruises and increasing analytical workloads of regional laboratories.

These costs could be offset by awarding sub-contracts for specified tasks. In-kind contributions could be sought from developed countries in the region (e.g. Japan and Australia) to conduct sampling cruises outside their territorial waters and engage scientists from other Asian countries.

2. Need for specialized analytical facilities

During the course of the five year project, it is probable that Member States will request information on radionuclides which can only be detected using Mass Spec., AMS or by other specialized techniques. Some isotopes (e.g. tritium) may be a valuable tracer of water masses, others might be used for tracking river inputs (e.g.  $^{18}\text{O}$ ). It is recommended that limited funds be provided for Technical Contracts for such specialized analytical work. There has already been some interest shown by New Zealand in conducting studies on tritium in the ocean under the RCA programme.

3. Lack of suitable hydrological and biogeochemical data to adequately model water circulation and mass-transport phenomena.

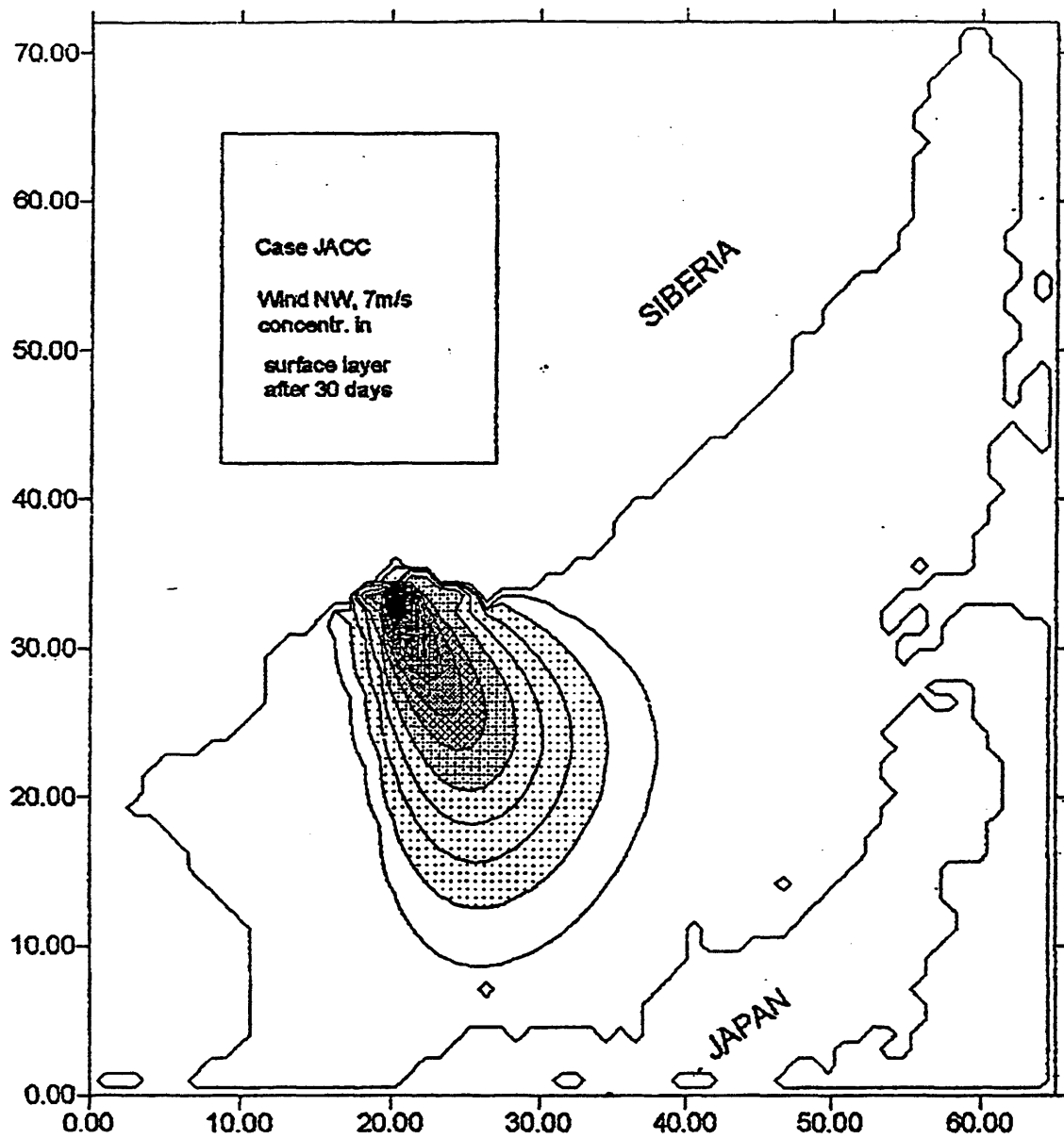


Figure 2. Example of the output from a dispersion model for a simple case study.

It is probable that limited data sets are available for most of the regional seas. Efforts will be made during the initial phase of the project to define all information gaps so that individual work programmes can be properly formulated.

One of the target objectives of the programme is to provide baseline data on the levels, distributions and transfers of radionuclides in water, suspended particulate material and biota. Very little or no information is presently available to provide understanding on critical pathways and processes by which contaminants may be transferred to people.

#### 4. Formulation of joint regional collaborative activities.

The overall objectives of this project should have a regional focus, i.e. to collect data on radionuclide levels, distributions and transfers in sea water, sediments and biota. Data assessments and information exchange can take place at annual Project Coordinators Meetings. It is proposed that some of these meetings could also be used to conduct joint sampling cruises (see 1997 work programme). Other possible examples of inter-regional exchange might include the following:-

- a. A cruise on the new Thai Fisheries Department research vessel in the Gulf of Thailand on both sides of the Thai-Malaysian border.

Research aims: to study possible cross boundary transport of dissolved and particulate radionuclides and associated contaminants by planktonic organisms.

Training-development aims: to train Thai and Malaysian scientists on appropriate methodologies for sampling and processing large volumes of sea water and filtered particles for analysis of radionuclides and associated contaminants.

The Thai vessel may be able to accommodate a few scientists from other nations.

- b. A sampling cruise on the large Indonesian research vessel in Jakarta Bay and off Muria Peninsula where Indonesia is seriously considering building its first nuclear power plant.

Research aims:

- (i) to perform pre-operational baseline studies on radionuclide concentrations and inventories in water and sedimentary materials.
- (ii) to determine existent concentrations of radionuclides and related chemical contaminants in and around Jakarta Bay.
- (iii) to collect and analyse sediment core profiles for Jakarta Bay for natural and artificial radionuclides in order to date and assess the rate and change of chemical contamination (radioactive and non-radioactive contaminants associated with population growth and industrial development) in sediments.

Training aims: (i) to train Indonesian scientists from BATAN and the Oceanology Centre on appropriate methodologies for sampling and processing large volumes of sea water and filtered particles for analysis of radionuclides and associated contaminants.

The Indonesian vessel may be able to accommodate several scientists from other nations.

c. A sampling cruise on a KORDI research vessel in areas of interest and importance.

Research: Continue collections of samples for radionuclide analysis as part of the joint Russian-Japanese-Korean collaborative programme to study the environmental impact of radioactive waste dumpings in the regional waters.

Training: Allow scientists from other nations to participate in a full-scale oceanographic cruise and obtain experience in the operation of large volume water samplers, deep-sea sediment corers and sediment traps.

d. Funding for inter-regional travel of scientists.

## 5. Summary Description

Controlled sustainable development in Asia and the Pacific is strongly coupled to energy needs and environmental protection. The growing dependence in the region on nuclear power production and the recently highlighted concerns about the dumping of radioactive waste in regional waters underscore the need for improving the fundamental knowledge about radionuclide levels, distributions and transfers in the regional seas of SE Asia. To obtain this background information, it is proposed to undertake a broad baseline study which will include surveys of key anthropogenic and naturally-occurring radionuclides in sea water, sediments and biota. Another primary goal is to derive existent levels of these radionuclides with which radiological assessment models can be developed. For dose assessment, this will require understanding of the critical pathways and processes by which these contaminants may be transferred to people.

Prepared by:

T. Hamilton  
IAEA-MEL/MONACO



## **COUNTRY STATEMENT BY AUSTRALIA**

### **SEVENTEENTH RCA WORKING GROUP MEETING**

**KUALA LUMPUR, MALAYSIA, 27-30 MARCH 1995**

The Australian delegation is most appreciative of the detailed arrangements made by the Government of Malaysia and the Malaysian Institute for Nuclear Technology Research for the hosting of the 17th RCA Working Group Meeting in Kuala Lumpur.

Australia is pleased to welcome the attendance of New Zealand for the first time and looks forward to its constructive input to the work that lies before this Working Group meeting.

#### **Regional Nuclear Cooperation**

Nuclear cooperation in the Asia-Pacific region continues to increase not only in volume but more importantly in effectiveness. This is evidenced in the rapid growth in the applications of nuclear technology to industry and health together with the development of nuclear power programs in several countries. Australia has given strong support to this growth and it is its intention to continue to provide support to a broad range of the technical cooperation and assistance activities of the IAEA and the RCA. It is well recognised that the success of effective technology transfer is dependent upon proper planning, development of human resources, and support for appropriate infrastructure development. Australia acknowledges the high standard of work undertaken by the staff of the IAEA and the RCA Member States to ensure that these development goals are achieved. However it is important that this development is sustained through the targeting of end-users and the maintenance and further development of national expertise to enable the full benefits of technology transfer to be sustained.

It is noted that the integration of the objectives of the UN Women in Development Program (WID) into RCA activities has continued over the past twelve months. Australia, together with many other donor countries, places fundamental importance on the need to ensure that women's central role in economic and social life is

reflected in all development activities. It is expected therefore that future RCA activities will be developed to further ensure the attainment of the WID goals.

Whilst the activities under the Joint UNDP/RCA/IAEA program have progressed satisfactorily during 1994, the large cuts to the country program for 1995 imposed by UNDP are of considerable concern to all RCA Member States. It is possible that the overall viability of the program will be seriously affected, with subsequent repercussions for the RCA program as a whole. Australia has raised these concerns with UNDP directly and urges others to press for the level of funding to be restored as soon as possible.

The commitment of the majority of RCA Member States to provide cash extrabudgetary contributions to the Program is most important to its continued success and a sign of its effectiveness and maturity. A sustained level of contributions will permit the range of activities to be expanded to cover those areas of technology relevant to the development of the region.

The RCA Coordinator plays an important role in the success of the RCA. Not only is he responsible for the day to day management of a large and complex program, but also for its development including the establishment of measurable outputs. Such a person must therefore not only have wide experience in the delivery and management of technical assistance within the Asia Pacific region but also have an established background in nuclear science and technology. In accordance with the recommendation of the 23rd General Conference Meeting of Representatives of RCA Member States, held in Vienna on 21 September 1994, Australia requests the Director General to appoint a well qualified person to be the next RCA Coordinator in a timely manner to ensure a smooth transfer of functions to occur during 1995. It is emphasised that to attract a suitable successor the present level of the position must be maintained.

## **Australian Funded Projects**

Under the umbrella of the joint UNDP/RCA/IAEA project, applications of isotope and radiation technology to regional development with special reference to industry and nuclear medicine, Australia has sponsored a project with the overall objective of contributing to regional development through a combination of infrastructure development, personnel training, and equipment support through activities related to industrial and medical applications of isotopes. The project has been designed specifically to meet IAEA and UNDP requirements and to have close linkages to the activities and outputs of existing parts of the UNDP project. Australia has provided an extrabudgetary contribution to the RCA amounting to of A\$1,500,000 for the three years 1993-1995 for the following three sub-projects.

### **Industrial Applications of Isotope and Radiation Technology**

This sub-project has been designed to achieve technology transfer through a process in which graduates from a series of regional training courses will augment the existing RCA structure to form a network providing a basis for a series of national seminars. Two training courses have been held; one on radiation technology and industrial isotope applications in 1993 and the other on applications of nuclear techniques to materials science in 1995. Five national seminars have been implemented to date in Korea, Pakistan, Mongolia, Vietnam and Sri Lanka and it is anticipated that another five will be completed this year. The topics covered in the national seminars, defined by consultation with national coordinators, have been application of nuclear techniques to process materials in the chemical and refining industries, application of nuclear techniques to the metals and manufacturing industries, application of nuclear techniques to coastal engineering and application of radioisotope technology to the coal and mineral industries.

### Industrial Radiation Protection

Through the application of distance learning techniques this sub-project seeks to provide countries with the support necessary for the development of basic minimum radiation standards and practices as well as the infrastructure for their implementation. The development and distribution of high quality training manuals for use in the region by both industrial users and regulators is progressing with 15 basic modules on radiation protection being developed with an additional small group of modules for regulators. Each module includes self assessed tests at appropriate points to ensure that part of the module is understood before the student progresses to further parts. Following the introduction and trial of the developed materials at a regional training course a series of regional seminars and practical workshops are planned.

### Nuclear Medicine

The objective of this sub project is the development of a program of distance education for nuclear medicine technologists who do not have specialist training in the nuclear medicine field. This program will provide for the achievement of a higher standard and uniformity of education in nuclear medicine technology. The materials being developed will be suitable for use at an individual level or they may be integrated into existing courses of training. Before finalisation of the material it will be used in a pilot scheme. A Project Advisory Board Meeting was held in July 1994 followed by a workshop for country coordinators in November. Following successful completion of the project it is expected that the nuclear medicine community within the RCA member countries would have acquired a level of self sufficiency with the training materials and methods provided during the project to be able to provide a national training program.

### **Additional Activities**

Australia has continued to provide training and experts for a range of activities in the RCA program in the fields of research reactor utilisation, maintenance of nuclear instruments, improvement of grain legume rhizobium symbiosis to fix atmospheric nitrogen, radiation sterilisation of tissue grafts, radiation protection infrastructure, non-destructive evaluation, nuclear analytical techniques, tracer technology and nucleonic control systems, radiation technology and nuclear information systems. It has also been an active partner in several Coordinated Research Programs under the RCA program.

### **Nuclear Non-Proliferation Treaty**

The Nuclear Non-Proliferation Treaty (NPT) is a crucial component of the Asia-Pacific security framework. It provides essential assurance that our region will be free of nuclear proliferation and thereby underpins the region's economic growth. The framework for cooperation provided by the NPT, particularly the derived assurance about peaceful use, has facilitated regional nuclear cooperation and trade as well as trade and cooperation with countries outside the region. Most countries in the region involved in nuclear science and technology are importers of nuclear material, equipment and technology. Their access to nuclear imports has been and continues to be greatly facilitated by the assurance offered by their fulfilment of NPT obligations.

The background paper on the activities of the RCA, accepted at the 23rd General Conference Meeting of the Representatives of RCA Member States for presentation at the 1995 NPT Review and Extension Conference, highlights the fact that the RCA has been an important vehicle for promoting cooperation and collaboration in the peaceful uses of nuclear science and technology in the Asia Pacific region.

However, it has long been recognised that peaceful nuclear trade and cooperation require an assured environment of security and stability over the long term. Planning, construction, operation and final decommissioning of nuclear power plants in most cases covers a period of the order of fifty years. The NPT has provided the long term secure environment needed to facilitate nuclear trade and cooperation, and Australia strongly supports and urges its indefinite extension.

## **Conclusions**

The RCA program and the joint UNDP/RCA/IAEA program of activities have achieved success in the transfer of nuclear technology in a range of disciplines throughout the region. It is to be hoped that the current cuts to the UNDP funded program are short lived and do not markedly affect its overall implementation and output, particularly as the ability to sustain development at the national level in the industrial and medical applications of nuclear science and technology is just being realised in many RCA Member States.

It is evident that there is a substantial regional commitment to cooperation in the peaceful uses of nuclear technology, a commitment that has further developed and strengthened with the increasing membership of the RCA. Australia is significantly involved in regional nuclear cooperation activities and continues to examine and develop its nuclear cooperation programs so as to best meet the needs of the region for the mutual benefit of all. The framework for cooperation established by the Nuclear Non-Proliferation Treaty has been a major factor in the smooth development of the nuclear industry in the region and has provided a firm foundation for the long term planning and major investments required by nuclear technology. Australia urges all RCA Member States signatories of the NPT to consider seriously the impact of less than indefinite extension of the NPT on their country's interests in the peaceful uses of nuclear technology.

## Country Statement - Bangladesh

### 17th RCA Working Group Meeting

27 - 30 March, 1995  
Kuala Lumpur, Malaysia

It is my great pleasure to participate as a delegate from Bangladesh in this 17th RCA Working Group Meeting in Kuala Lumpur, beautiful capital of Malaysia.

Bangladesh has been actively associated with RCA since its inception and has been participating in almost all activities of this august body. Bangladesh has been greatly benefitted by various activities of the RCA to enhance national efforts in the field of nuclear science and technology.

A brief description of activities in various projects in Bangladesh during the 1994 are given below:

#### 1. UNDP/IAEA Industrial Project:

Bangladesh has been participating in all components of this project, although the activities in respect of tracer technology and radiation processing are still in the initial research and development stage.

##### (a) Non-Destructive Testing Project:

- i) NDT Services: During this period BAEC rendered necessary NDT services using radiography, ultrasonic, eddy current, magnetic particle and liquid penetrant testing methods in power stations, fertilizer factories, air crafts, sugar mills, pylon industries, flood action plant project and paper mills.
- ii) NDT Training & Seminars
  1. Two radiographic testing level 1 training courses were organized in Sept-Oct. 1994 in which 37 participants attended. These training courses were organized in accordance with IAEA TECDOC 628 and ISO 9712. These training courses were conducted by National Qualifying Body and BAEC.
  2. Bangladesh Society for NDT organized one day seminar on NDT in industry in Feb. 1994 and one week training course on "NDT Appreciation Course" for Mid Level Executives of industries in July, 1994 in which 125 delegates and 28 participants attended respectively.
  3. Two NDT training courses were organized for the participants of Flight Safety Officer's Training Course of Bangladesh Air Force in Aug. & Dec. 1994.
- iii) R&D Works: Necessary R&D Works in the NDT Division of BAEC is going on. A group of three B.Sc.(Engg.) students of Bangladesh University of Engineering & Technology persuing their project work under this R&D programme.

Programme for 1995-1996: National training courses on UT-2, RT-3, NDT for concrete, SK-2, UT-3, UT-3 and SM-3.

**(b) Radiation Processing:**

In this field, scientists are engaged in wood plastic surface coating using UV techniques. Research and development activities on wood plastic composite surface coating curing and radiation vulcanization of natural rubber latex have been successful and a pilot plant is being planned with the aim to go into small scale commercialization in future.

A national seminar on Radiation Curing of Surface Coating was organized in May/June, 1994 and a national training course is scheduled to be held on UV Radiation Curing in 1995.

**(c) Nuclear Analytical Techniques(NAT):**

The nuclear, nuclear-related and the chemical methods of elemental analysis that have been developed in the Chemistry Division, Atomic Energy Centre, Dhaka (AECD) are summarized with respect to their applications in R&D programmes and chemical analysis services. Junior scientists and University students also received training from this programme.

**Development of Instrumental Methods of Chemical Analysis for Elemental Composition of Materials:** The Division has developed instrumental methods (PIXE, PIGE, TXRF, SRF, AAS, DPSV, GLC, ISE, etc.) of chemical analysis for different elements at trace and ultra-trace level of concentrations in industrial, agricultural environmental and biological materials methods are now being used to provide analytical services and to support research projects such as:

- Status of minor and trace elements (toxic and essential) in biological tissues and fluids, foodstuffs, drinking water, sediments, soils and fertilizers.
- Monitoring of heavy metal pollution in rural and urban air, ground and surface water and industrial effluents.
- Deposition monitoring of atmospheric pollutants.
- Studies of organic micro pollutants especially hydrocarbons and phenolic compounds reference materials supplied by the IAEA.

**(d) Industrial Tracer Technology (ITT) and Nuclenic Control System (NCS)**

The introduction of tracer technology & NCS in Bangladesh is still in the early stage due to some unavailable reasons. So far under this project the following activities were carried out.

- 1) Three National Executive Management Seminar (1988, 1991, 1995).
- 2) Two demonstration experiments:
  - a) Mercury inventory in Coastic Soda Plant (1988)
  - b) Gas flowmeter calibration of Titas Gas Transmission and Distribution Company Limited (1991).
- 3) Two survey reports were published on the application of NCS in Paper mill (1986) and Steel mill (1992) in Bangladesh.
- 4) In the process of implementation of the project activity, Bangladesh has received a number of expert services through RCA and IAEA.
- 5) Manpower training: Most of the National Tracer & NCS group members have attended Seminar/Workshop for a period of 2-3 weeks organized by UNDP/RCA/IAEA time to time.



**Future Programme** a) Column Scanning in Petroleum Refinery, b) Effluent dispersion studies related to environment.

In the recently concluded National Co-ordinator's Meeting on tracer technology & NCS held in Colombo, 13-17 Feb. 95, a consensus recommendation was made to give more assistance to Bangladesh in this particular field to bring them up to a general level of capability of other RCA countries.

## **2. Research Reactor Utilization: RAS/4/011**

During the last one year following activities have been carried out under research reactor utilization programme:

**Neutron scattering:** Rietveld's data analysis programs RIET and MAGRIET have been modified from mainframe version to PC version.

Neutron diffraction experiments were performed on Ni-Zn ferrite and Ba ferrite at room temperature. Data analysis was done with Rietveld's code and compared with X-ray diffraction data.

Studied neutron diffraction of the superconductor  $(\text{BiPb})_2 \text{Ca}_2 \text{Cu}_3 \text{O}_{10}$ . Data analysis is continuing. Implemented the latest version of Rietveld's profile analysis programs FULLPROF and RIETAN in 80486 PC.

Neutron diffraction data of NaCl (normal) and NaCl (iodized) have been acquired and analysed with Rietveld's profile program FULLPROF and RIETAN. Good agreement was observed with X-ray diffraction data.

Neutron diffraction studies of superconductor  $\text{YSr}_2\text{Fe}_3\text{O}_8$  have been completed.

It was possible to introduce Bonse and Hart's Small Angle Neutron Scattering technique (double crystal method) successfully for the determination of shape and size of the particles in a homogeneous medium.

**Neutron Radiography:** Studies of absorption of water in local and foreign building materials are continuing.

Radiographic studies were performed on leather, rubber, plastics and ceramics from local industries and obtained good radiographs which were analysed to find out variation in optical density. Fullchrome leather and EVA rubber are found better than others.

## **3. Medical and Biological Applications of Nuclear Techniques:**

a) **Radioimmunoassay (RIA) of Thyroid Related Hormones:** Through the participation in this project 10 laboratories for RIA have been developed. Interlaboratory quality control programmes have recently been started in the country with useful results.

(b) **RIA for Hepatitis B Diagnosis:** Bangladesh is participating in this RCA project for diagnosis of viral hepatitis with RIA. Kits and Bulk Reagents being received from China through the assistance for IAEA. Five laboratories in the country have been participating in this project.

At present target groups, namely medical workers, pregnant mothers, neonates and blood donors are being screened for hepatitis. During the 1994-95, total number of 4315 mothers were screened and incidence of viral hepatitis were 0.39%. In the present studies patients suffering from liver diseases have also included. Quality control programme has been included with other countries in this region.

Two scientists attended training course in Bangkok, Thailand, held in February-March, 1995 on "preparation of basic reagents for RIA of viral hepatitis". One scientist received training for 4 months in Bangkok in RIA techniques which will be helpful for using bulk reagents reducing cost of assay. At the sametime arrangements have been made for immunization of HBsAg negative babies born of positive mothers.

(c) Bangladesh also participated in the project, Radioaerosol permeability studies with BARC Nebulizer which has been successfully completed with the final RCM held in December, 1994 in Bombay. Future activities in this project are being planned.

(d) Strengthening of Nuclear Medicine: The first meeting of the Advisors Board was held in July 1994. The Australian counterpart of the project presented draft proposal of the technician training programme. It was discussed the finally accepted programme was received in October, 1994. In Bangladesh there exists some training programme and it was decided that the training programme agreed upon will be included in the present programme. This process is being done.

(e) Radiation Sterilization of Tissue Grafts: Both scientists and clinicians have been engaged in this project. In radiation sterilization of tissue graft project sterilized amniotic membrane for dressing burn wound and bone pieces for use in orthopaedic and dental surgery are being produced. These materials are used in limited quantity at present. However, demands for this material are increasing gradually. A seminar was arranged recently in which various activities in this field was discussed.

(f) Bangladesh is also participating in two other projects, namely improvement of cancer therapy and use of radioiodine in management of thyrotoxicosis.

(g) Maintenance of Nuclear Instruments (Medical): After the last Regional Planning Meeting on Quality Assurance in Nuclear Medicine, held in Dhaka, Bangladesh, from Nov. 28 to December 2, 1993, emphasis has been given to the design and development of PC based nuclear medical equipment. The scientists/engineers of the Institute of Electronics are presently working on the "Design & Development of a PC based Thyroid Uptake System" and "Design & Development of a PC based Hand and Foot Monitor System". The First National Workshop on Computer Interfacing was held at the Atomic Energy Centre, Dhaka from March 24 to April 21, 1994. It was jointly organised by IAEA and BAEC. Dr. Peter Pellionisz, an expert from IAEA was present during the workshop.

The PC based Thyroid Uptake System is in its final stage. It has already been tested successfully with the patients at the Institute of Nuclear Medicine, Dhaka. To multiply the equipment financial support is expected from IAEA under the project "Upgradation of Nuclear Medical Equipment", Project Code No. BGD/4/020 for the year 1995-96.

We are also expecting two Searle Type Gamma Cameras from the Royal Prince Alfred Hospital, Australia as a grant from compatible. Two Experts will later be sent to Bangladesh to help us first in repairing them and then upgrading these Gamma Cameras as soon as we let them know about the arrivals of the Gamma Cameras in Bangladesh.

#### **4. Maintenance of Nuclear Instruments:**

Under this project the scientists are involved in the repair and maintenance of different types of nuclear and analytical instruments belonging to various units of BAEC and Dhaka University as well as outside organizations.

The overall programme are grouped in the following areas:

Repair, maintenance, calibration and installations of nuclear and analytical instruments, academic training and design, development and assembling.

Repair and maintenance of twenty instruments of BAEC and other organizations are being carried out in the year 1994.

Completed projects are (a) Design of a general purpose microcontroller (b) design of a sample changer for PIXE experiment (c) development of the monitor programme for the up-8085 trainer kit.

Ongoing projects are (i) development of a programmable temperature controller required in the vibrating sample magnetometer for automatic and precision control of temperature of the oven in the magnetic material division, AECD. (ii) development of a computer interface for the immersion scanner for C-scan display in ultrasonic flaw detection for the Non-Destructive Testing Division, AECD (iii) development of a programmable power supply.

#### **5. Project on Energy and Nuclear Power Planning/Phase-II**

The Project Formulation Meeting held in July, 1993 had reviewed the outcome of the RCA project on Energy and Nuclear Power Planning (1987-92) and identified the following priority activities:

1. To enhance and improve there liability and quality of forecasting, planning and analytical capabilities in the region for future energy and electricity needs and impacts; and
2. To enhance quality of input data with particular reference to the requirements of WASP model.

A meeting of a panel of national experts was held in Jakarta from 12 to 16 December, 1994 to review problems with input information, to conduct country studies and to provide recommendations on improvement in data on the basis of experience of countries in this region. Participant from Bangladesh presented a paper and made specific recommendations on the problems faced in collection and processing of data required for WASP. The meeting underscored the need for regional cooperation on identification of common problems and for exchange of experience in solving them. With this end in view, it was recommended to undertake expert Missions in some selected countries. The Meeting proposed a Workshop for presentation of the reports on these Missions and reports from other countries according to an uniform format, which would help resolve most of the problems with input data and information.

Identification of barriers faced by the RCA countries in implementing nuclear power projects and exchange of information on formulating national strategies in overcoming such barriers is a new activity under the RCA project on Energy and Nuclear Power Planning. Participating countries were requested to prepare country reports for which a standard format has been suggested. Bangladesh country report is being prepared now according to this format.

It is noted with satisfaction that the activities of the RCA project on Energy and Nuclear Power Planning proposed for the next 2-3 years recognize the need for identification of problems in planning and implementation of nuclear power projects in the countries of the region. The components on improving the quality of input data and enhancing planning capability are expected to help the process of decision making and in formulation of a programme in removing the barriers of introducing nuclear power in the concerned countries. The envisaged scopes of sharing of experience and information within the region are also likely to benefit all the RCA countries, thereby improving the overall impact of the project.

#### **6. Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen**

Six groundnut cultivars and four chickpea cultivars were field tested at three locations against *Bradyrhizobium* inoculant. At one site labelled  $^{15}\text{N}$  urea was used to estimate biological nitrogen fixation potentials of the cultivars. Variations were observed amongst the cultivars in both the groundnut and chickpeas. This was recommended as a commercial variety by the seed board. Some of the groundnut studied under this project were found to be very promising and are expected to be released as a commercial variety in near future.

#### **7. Food Irradiation Process and Acceptance**

RCA countries of Asia and the Pacific Region including Bangladesh participated and Food Preservation Section of the Joint FAO/IAEA Division Coordinated the activities. Under the project management research contracts/agreements were awarded to each country and a number of Workshops/Group training courses were organized on different aspects of Food Irradiation Technology during the tenure of the project for smooth transfer of the technology.

The Central purpose of the RPFI-Phase III project was to seek effective food irradiation technology transfer through proper process control as envisaged in the Codex Alimentarius Commission's relevant 'Standard of Irradiated Foods' and associated Code of Practice for Operation of Radiation Facilities for Treatment of Foods' with adoption of Good Manufacturing Practice (GMP) and Good Irradiation Practice (GIP). Special emphasis was laid on detailed dosimetry in the irradiation process and undertook enhanced market testing of irradiated products.

#### **8. Strengthening of Radiation Protection Infrastructure in Bangladesh.**

Bangladesh Atomic Energy Commission (BAEC) is responsible for developing and strengthening the radiation protection infrastructure in Bangladesh through the successful enforcement and implementation of the Nuclear safety and Radiation Control Act'93 (NSRC Act, 93) and the participant regulations guiding codes, etc in order to save man and the related environment from the under risks of ionizing radiation.

Regulatory activities: In the light of the variation protection Act and the ICRP recommendations 1990, the draft regulations have been prepared and presently under final review by the competent team before seeking the approval of the Ministry of Science & Technology.

Calibration and Standardization: Radiation measuring instruments are calibrated using SSDL facilities.

Radioactive Waste Management: Solid, liquid and gaseous wastes originating from research reactor, radio-isotopes production facility, medical uses of radio-isotopes, etc. are safely managed as per ICRP norms and practices. A plan is being prepared for construction of a central storage facility at AERE, Savar.

Expert Mission: Dr. S.D. Soman, IAEA expert, visited Bangladesh during Oct., 1993 for regulatory infrastructure assessment. The recommendations given by him are being implemented step by step.

Seminar, Workshop, Symposium: A national workshop on the safe use and control of ionizing radiation in medical fields was held in order to create occupational and public awareness and to strengthen and ensure safe use and control of ionizing radiation in medical fields in the country.

#### **Conclusion:**

In conclusion, as a deligate from Bangladesh I wish to express our satisfaction with the implementation of various RCA activities and hope for further promotion of regional cooperation in peaceful uses of nuclear science. On behalf of Bangladesh, I would like to thank the Government of the Malaysia for hosting 17th RCA Working Group Meeting. We look forward to continue cooperation under RCA.



## China's Country Statement for the Seventeenth RCA Working Group Meeting. Kuala Lumpur, Malaysia, 27-30 March 1995

presented by Zhu jiang  
(China Atomic Energy Authority)

Mr. Chairman, Distinguished delegates, Ladies and Gentlemen:

It is my great pleasure to participate at the seventeenth RCA Working Group Meeting here in Kuala Lumpur, Malaysia. On behalf of the Chinese delegation, I would like to express my gratitude to the Government of Malaysia for its excellent work in planning and hosting this meeting and for the warm hospitality.

China sees the RCA a very successful architecture, and is pleased to note the continued progress of RCA activities in recent years. The new UNDP/RCA project entitled 'The use of isotopes and radiation to strength technology and support environmentally sustainable development' has been implemented. While China has benefited a lot from the RCA programme, we have also made our efforts to contribute to the region. From 1995, the Chinese extrabudgetary contribution to RCA will be in cash rather than 'in kind' as at before (50,000 US\$/year). We will do our best for the sustainable development of the region.

At this point, allow me to highlight our participation in the different projects.

### **I. Industrial Projects**

#### **1. Tracer Application:**

The National Tracer Group (NTG) in China Institute of Atomic Energy (CIAE) had studied the use of  $^{60}\text{Co}$ ,  $^{51}\text{Cr}$  and  $^{125}\text{I}$  as radiotracers for well logging, tracing the injected water. Good results achieved.

One Chinese participant attended the RTC on Application of Isotope Techniques in Process Optimization, in Bombay, Nov. 1994.

The International Conference on Isotopes (ICI) will be held from 7-12 May 1995 in Beijing. The Isotope Society of China will be the host. Its scientific programme covered the radiation processing, radio chemical and activation analysis, isotope and human health, isotope and environment, stable isotope, radioisotope preparation and radiation safety.

At the same time, 7-12 May 1995, IAEA will organized a Expert Advisory Group Meeting (EAGM) on Computer Modeling of Tracer Flow Experiments in Beijing parallel with the ICI.

## **2. Nuclear Control System(NCS)Application:**

NCS application in Chinese paper, steel and other industries has achieved some success. Over 100 sets of NCS have been running on line in Chinese Paper mills. Among them, 80 sets were imported, the rest were domestic made, produced in Shanghai Institute of Process Automation Instrumentation(SIPAI) and some other place. In Chinese steel industry, there are more than 370 sets NCS operated at more than 10 iron and steel works. Among them, level gauge, thickness gauge, neutron moisture gauge, nuclear weigh scale, r-ray relay were the main NCS. At Baoshan Iron&Steel Group Co., there were 96 sets NCS in operation. All these NCS had been contributed some economic and social benefits.

A Regional Workshop on NCS in Paper Industry and a REMS on the same title have been arranged at Shanghai and Beijing, respectively, but postponed to next year.

## **3. Radiation Processing:**

### **•Radiation Curing**

A National Workshop on Radiation Curing was held in Beijing from 9-12 May 1994. Rad Tech China was the host .

The 5th International Conference on Radiation Curing(Rad Tech Asia 95) will be held in Guilin, China from 21-24 Nov.1995. Parallel with the International Symposium on same title in Bangkok, Thailand.

It is proposed that a National Workshop on EB/UV Radcuring Technique will be hosted by Shanghai University in Shanghai from 18-25 Sept.95.

### **• Radiation Crosslinking**

In recent ten years, radiation crosslinking industry(wire , cable, shrinkable materials)have been formulated in China. In recent years, the total output of this industry reached 200-300 million RMB yuan per year. More than ten RCA/UNDP Activities (RTC, NTC, REMS, RW) have been arranged on this subjects in China. These RCA activities have good relation with Chinese crosslinking industry development.

A National Workshop on Radiation Crosslinking Application was held at Shanghai University of Science and Technology on 25-29 April 1994. About 35 participants attended . This is the seventh activity hosted in China relating radiation crosslinking application in wire and cable industry. Up to now, there are 26 sets EB accelerators (both imported and domestic made) in operation in China, for radiation crosslinking, curing and sterilization.

### **•Radiation Sterilization**

Radiation Sterilization of medical supplies are very important for China. Now there are several r facilities and EB accelerators in operation for sterilization.

A National Training Course on Radiation Sterilization-Validation. Routine Control and Application of ISO Standard, proposed on 4-13 October 1995, will be



held in Beijing, hosted by Beijing Radiation Center and Beijing Radiation Application Research Center.

**•Radiation Vulcanization of Natural Rubber Latex (RVNRL)**

A National Workshop on RVNRL was arranged in Suzhou, 16-22 November 1995. Suzhou Medical College will be the host institution. The optimal experiment condition, mechanical properties, irradiation condition, quality control and industrial application of RVNRL will be discussed. In recent years, Suzhou Medical College will cooperate with Suzhou Rubber Latex Factory to develop a pilot scale production base producing latex products, such as gloves, pipes, balloons and condoms, using RVNRL technique.

**•Radiation Engineering**

There are 50  $^{60}\text{Co}$  Gamma Radiation Facilities in operation in China (The Design Capacity more than 100 KCi), The Total Design Capacity is 23.3 MCi (Million Curies), Actual Loading is 6 MCi. All the facilities are multipurposed, do radiation sterilization of medical supplies, radiation chemical products and radiation preservation of foods.

This year, some new facilities have been or will be into operation: Cixi(Zhejiang), Changchun, Kunming(Yunnan), Zhongmu(Henan), and Yanbian(Jilin) radiation centers.

A National Workshop on Economic Beneficial Operation of Gamma Facilities have been arranged on July or October 1995 in Qingdao, Beijing Institute of Nuclear Engineering(BINE) will be the host institution, Canadian Company Nordion will be cosponsor.

**•Radiation and Environment**

The environment problem caused by the increased world energy demands are becoming of growing importance internationally. Radiation Technology can be used to solve some these problems. Flue gas treatment using EB accelerator to remove  $\text{SO}_2$  and  $\text{NO}_x$  have been demonstrated at Poland, Japan and other countries. In 1993, we organized a NEMS on this subject; last year, 3 Chinese participants attended the Takasaki Workshop; this year, we proposed to hosted a NEMS on this title, so as to dissemination the information of EB Flue Gas Treatment to the executive managers of electric power production sectors. In China there are several units interested in this technique: Qinghua University, China Institute of Atomic Energy, Shanghai Institute of Nuclear Research and some power plant in Guangdong, Sichuan and Liaoning. Some conceptual design of pilot plant for Flue gas treatment by EB irradiation have been finished, but the main difficult is no money for the big project. We hope more cooperation with IAEA and other countries in this area.

We also interested on radiation treatment technology of sewage & sludge.

#### **•Radiation Application in Biology and Medicine**

From 12-16, December 1994, a Regional Seminar on Radiation Technology in Biomedical application was held in Shanghai, Shanghai University of Science and Technology was the host institution.

#### **4. Non-Destructive Testing**

The Non-Destructive Evaluation Technique has wide applied in different industrial sectors in China. A network on NDT R&D has been developed in China.

A Regional Seminar on Application of NDE in Electric Power Generation have been arranged in Shanghai, this year. Shanghai Nuclear NDT Center will be the host institution. This is one of Chinese Contributing RCA activities this year.

#### **5. Nuclear Analytical Technique**

Nuclear analytical techniques are very important techniques for environment, health, industry, agriculture and archeology. China have research reactors, accelerators and nuclear laboratories, and can do NAA, PIXE, XRF and many other analysis techniques.

China actively participated all the RCA subprojects: Environmental nuclear analysis, intercomparison, mercury in human hair, airborne dust particle, air pollution study, and others. We hope some activity will be held in China.

### **II .Food Irradiation Preservation**

From August 1994, China participated the International Consultative Group on Food Irradiation(ICGFI).The Chinese National Coordination Group on Food Irradiation(NCGFI) was organized since 1988, the State Science and Technology Commission(SSTC). The Ministry of Public Health(MPH), the China National Nuclear Corporation(CNNC) and agriculture, commerce, foreign trade, food industry, Academia and other ministries were members. Recently, the NCGFI has a meeting discussing for clearance, public acceptance and market testing and many other items of food irradiation.

A Regional Workshop on Food Irradiation Commercialization Market Testing will be held in Beijing from 29 May to 2 June 1995.

### **III. Nuclear Agriculture**

China is a member of project on the use of isotopes in studies to improve yield and N<sub>2</sub> fixation of grain legumes with the aim of increasing food production and saving N-fertilizer in the tropics and sub-tropics of Asia. In Harbin and Beijing, two laboratories participated this CRP.

Nuclear Techniques applied in Chinese agriculture are popularized can make remarkable economic and social benefits and is important to improvement of people's life. Radiation mutation breeding, low dose stimulation of growth,

Isotope tracer application, RIA and ELISA in animal science, agroforestry, SIT Technique are very useful and beneficial techniques.

#### **IV. Medical and Biological Application**

China participated the Project on diagnosis of Hepatitis B(HBV) infection by RIA, and supplied a complete package of bulk reagents for RCA member states.

China is a active member of Project Radiation Sterilization of Tissue Grafts. A RTC on open Learning Techniques applied to Radiation Sterilization of Tissue Grafts was held in Suzhou, from 13-24 June 1994. 23 participants attended.

A NTC on QC of Nuclear medicine Instruments was proposed in Beijing this year.

A National Training Course on Nuclear Medicine doctors and technicians will be held November 1995, in Shanghai and Suzhou respectively.

China strongly supports and participates following nuclear medicine activities: Use of computer for Tc-99m imaging for diagnosis of respiratory diseases; Air pollution and lung function; distance learning for nuclear medicine; Radiotherapy of carcinoma of cervix; I-131 treatment for hyperthyroidism; Upgrading of analogue gamma cameras; QA in nuclear medicine and many others.

#### **V. Radiation Protection:**

The rapid development of nuclear energy and applications of radiation and isotopes in China demands higher management level of radiation protection and safety. We are actively participated almost all the subproject of Radiation Protection Infrastructure. A Regional Workshop on External Dose Assessment Techniques was held on 19-26 July 1994 at Taiyuan, this was supported by Chinese extrabudgetary contribution to RCA, 14 participants attended.

We are actively participated in the CRP on Ingestion and Organ Content of Trace Elements of Importance in Radiological Protection for Reference Asian Man, both Phase I and Phase II.

A National Seminar is planned in 1995 to study and exchange ideas on BSS(International Basic Safety Standard for Protection against Ionization Radiation and for the Safety of Radiation Sources).

It is proposed that a National Training Course on Radiation Safety of the Irradiation Facilities in 1996, which will be cosponsored by the China Atomic Energy Authority(CAEA) and the Ministry of Public Health(MPH).

#### **VI. Research Reactor, Energy and Nuclear Power Planning**

In China, there are six research reactor and two nuclear power plants in operation. Seven Miniature Neutron Source Reactor(MNSR, 27Kw) have been in operation, four in China, three in other countries.

We are very interested on the broad range of use of neutron reactors, such as materials development, silicon transmutation doping, radioisotope production, neutron radiography, neutron activation analysis and neutron scattering, and will actively participated all the related activities.

With regard to the Energy and Nuclear Power Planning Project, China has actively participated the related activities , for example, the EAG Meeting on effective strategies for nuclear power programme implementation among RCA countries, the WASP, MAED and ENPEP Model related activities. On February 1995, a Regional Workshop on Safety and Reliability Improvement through Optimized Maintenance of NPPs was held in DAYA BAY NPP, China.

Isotope and nuclear technique application in marine science, geology science and others are interested for us.

We proposed a Regional Training Course on application of Isotopic and geochemical techniques in exploration and utilization of medium to low temperature geothermal resources will be held in Lushan, China, on second part of this year . This activity can be considered as a chinese extrabudgetary contribution to RCA in 1995.

Mr.Chairman, China will continue her support to the UNDP/RCA/IAEA joint project and all RCA subproject . For the environmentally sustained development, for the technology transfer and information dissemination, China can share her manpower, knowledge, equipment , experiences servicing for the region. We can contribute Research Reactor, MNSR, EB accelerator, Gamma facilities, NCS in paper and steel industry , RIA and other kits, some radiopharmaceuticals and radioisotopes, to this region.

Finally, I would like to join other delegates to express our sincerely thanks to the Government of Malaysia, the Malaysian Institute for Nuclear Technology Research (MINT), for hosting this important 17th RCA Working Group Meeting and for their kind hospitality and the excellent arrangements extended to us during our stay in Kuala Lumpur, Malaysia.

Thank you.

17TH RCA WORKING GROUP MEETING OF MEMBER STATES

KUALA LUMPUR, MALAYSIA, MARCH 27-30, 1995

**COUNTRY STATEMENT - INDIA**

Dr. S. Gangadharan  
Chief Executive  
Board of Radiation and Isotope Technology  
Bombay, India

**INTRODUCTION**

Please allow me to express our deep sense of appreciation and thanks to the Government of Malaysia for hosting this meeting in the City of Kuala Lumpur, which truly represents the combination of cultural heritage and rapid economic strides. India has enjoyed a long and fruitful association with the scientists of the universities and the Nuclear Energy Unit of this country. I had the pleasure of close interaction with many of my professional colleagues in Malaysia and we have had exchanges of scientists for mutual benefit. I would also like to recall, with happiness, that the scientists in Malaysia were the first to carry out instrumental neutron activation analysis using irradiation in the reactors at Trombay, more than two decades ago.

The Regional Cooperation Agreement has been both binding force as well as a synergic catalyst in bringing together scientists of Asia and Pacific region in solving problems of mutual interests. The successful extension of the agreement and the increase in the number of participating countries auger well for the programme. This is further substantiated with many of the Member States making cash contributions towards the RCA programme giving clear proof of the importance which the participating countries attach to these programmes. India, as a founder member of the RCA has provided support in cash and in kind to the programmes under the RCA, has always offered to share the facilities and expertise with the scientists in this region and will continue in

the future as well.

Apart from the application of nuclear science & technology for power generation, the non-power peaceful applications of nuclear science & technology, particularly, radioisotopes and nuclear techniques in medicine, industry and agriculture, provide a tangible role of nuclear technology in everyday life, and hence have also been one of the major objectives of India's nuclear programme. With the increasing acceptance of nuclear technology in different spheres, we are looking forward to a challenging period ahead in catering to these demands that are not only of commercial value but of high societal value. This report gives a brief summary of the work carried out in India in different RCA projects and also the UNDP funded industrial project.

### **RESEARCH REACTOR UTILISATION**

A variety of neutron scattering experiments have been conducted making use of the research reactors Cirus and Dhruva at BARC. A 60 cm diameter two dimensional position sensitive detector for SANS has been fabricated and currently it is under test. A new filter detector spectrometer for inelastic neutron scattering has been commissioned at Dhruva reactor. The first of neutron reflectivity measurements has been carried out on metallic multi-layered systems. The Research Reactor Utilization at Trombay has lead to several proposals for carrying out experiments at Rutherford Appleton Laboratory, U.K. A formal agreement between BARC and RAL was signed in June 1994 extending the earlier agreement between the two Centres for scientific collaboration on ISIS Pulsed Neutron Source at RAL. Within the cover of this agreement, BARC is fabricating major components for a new polarized cold neutron beam line OSIRIS to be installed at ISIS.

Efforts to develop liquid methane cold neutron source at Dhruva are in progress. Design and development of microstrip detectors for neutrons using printed board cir-

cuits is in progress. The first experiment aimed at directly verifying Pauli anticommutation was implemented with a neutron interferometer in a collaborative experimental program between BARC, Atom-Institut at Vienna and Missouri University Research Reactor at Missouri. Neutron Scattering data from amorphous GeSe systems have been analysed using a reverse Monte Carlo program developed at BARC. A small angle neutron scattering spectrometer at Cirus reactor has been upgraded by installing a position sensitive detector. As a result the throughput of the instrument has increased by atleast a factor of 20 in data collection rates.

Several RADC's have been developed and fabricated and installed at 4 neutron spectrometers where linear position sensitive detectors are being used. This RADC helps to do away with a matching pair of ADC as well as a ratio circuit.

The National Coordinator from India had tried to explore with the other counterparts a CRC with the Agency for developing a neutron diffractometer in the region as per the decision of the Project Formulation Meeting held in Korea in April 1994; however, the response has not been very encouraging.

## **MEDICAL AND BIOLOGICAL APPLICATIONS**

The work on the Radioaerosol inhalation imaging for diagnosis of respiratory diseases has been completed and a final report on this project has been sent to the Agency in August 1994.

A distant education programme on Nuclear Medicine is being started in collaboration with the Royal Prince Alfred Hospital, Sydney, Australia.

On the project on RIA for hepatitis B diagnosis, use of coated beads and preparation of controls constituting the aspects of preparation of reagents and limited clinical evaluation of the reagents were carried out. At the Coordinators Meeting held at Sydney during October, 1994, it was decided that the preparation of bulk reagents will be limited, to HBsAg and Anti HBs Assays. As the requirements for other markers are limit-

ed, use of Anti-HBC kit is to be suspended till CIAE, China comes out with a better kit. RCR, Bangalore is one of the labs which will work on a revised procedure for anti-HBe and HBcAg assays. A scientist from India was invited to be an Expert & Lecturer for the RCA Training Course on advanced methods for local reagent production for RIA Hepatitis-B markers held at Bangkok, Thailand during Feb. 20 - March 3, 1995. Three persons from India attended the training course.

A Coordinated Research Programme (CRP) on "Introduction of Computer Assisted Dosimetry and Database in radiotherapy of the Cervix in Asian Countries (RCA) initiated a study on "Clinical Trial for Carcinoma of the Uterine Cervix : Contract No. 6043/JN" at Tata Memorial Hospital from September 1990. The study was aimed at computerised dosimetry in stage IIIb carcinoma of the cervix to evaluate the PC-based treatment planning software supplied by IAEA. The final RCM was held at Seoul (Republic of Korea) between March 28-30, 1994. The results of the studies from various member countries were evaluated. There has been overall concordance of isodose levels among the data generated by conventional treatment planning software and IAEA supplied PC-based system. The study has been concluded.

A study for CRP on "Modern Techniques in Brachytherapy with Special Reference to Developing Countries" is undergoing since December 1993 on "Radical Irradiation for Conservative Management of Early Breast Cancer and Role of Bio-Effect Models: Contract No. 7676/RB, which is aimed to study the survival rates, recurrence pattern and cosmetic outcome in the early breast cancer treated with conservative management. Study for "Head and Neck Cancers : Multimodal Therapy" as a part of CRP on "Randomized Clinical Trial of Radiotherapy combined with Mitomycin-C in Head and Neck Cancer" had been sent for consideration and approval and the accrual of patients will start shortly.



### **Radiation Sterilization of Tissue Grafts (RAS/7/003)**

The tissue bank at the Tata Memorial Hospital under the project for the Radiation Sterilisation of Tissue Grafts (RAS/7/003) has in the year 1994 processed a variety of tissues (Table I) obtained from Cadavers, limb amputations and other surgical procedures (Table II). These freeze-dried, gamma irradiated allografts have found clinical applications as indicated in Table III.

**Table I: Total No. of Grafts Produced, 1994-1995 (MARCH)**

GRAFT	1994	1995
AMNIOTIC MEMBRANE	146	25
SKIN	42	50
DURA MATER	336	58
BONE BLOCK	66	16
ILIAC CREST	50	14
RIB	117	54
BONE DUST (5 gms packet)	28	--
ELBOW JOINT	1	--
SEGMENT OF ULNA	1	--
SEGMENT OF HUMERUS	1	--
SEGMENT OF RADIUS	1	--

**TABLE: II DONORS DETAILS : 1994-95 (MARCH)**

	1994	1995
CADAVERS	197	29
SURGICAL PROCEDURES	67	40
AMPUTATIONS	1	--

TABLE III: CLINICAL UTILIZATION OF ALLOGRAFTS : 1994-95

ALLOGRAFT	1994	1995	CLINICAL APPLICATION
AMNIOTIC MEMBRANE	391	36	- Burns
SKIN	35	-	- Burns
BONE BLOCK	122	19	- Varied Orthopaedic conditions
DURA MATER	75	26	- Brain tumour - Dural replacement - Abdominal Wall repair - Thoracic wall repair
ILIAC CREST	27	5	- Bone replacement
RIB	3	-	- Reconstruction of chest wall - mandibular reconstruction
BONE DUST	3	-	- Periodontal osseous defects
FASCIA LATA	2	-	- Severe compound fractures of toes
ULNA	1	-	- Bone replacement
METATARSAL	3	-	- Bone replacement
TIBIA	1	-	- Bone replacement
FIBULA	1	-	- Bone replacement

#### NUCLEAR INSTRUMENTS MAINTENANCE PROGRAMME

The highlights of the Nuclear Instruments Maintenance Programme during the year include development of an interface card from gamma camera to PC, development of EPC Expert System and distribution of handbook of Nuclear Medicine Instrument to RCA member countries. The Agency has placed an order for 32 interface cards to be supplied to member countries in Asian and Latin American regions. One card with on-board processor has been installed at Peru. The agency upgrade system was demonstrated during the Project Planning meeting held in Cuba.

EPC Expert System has been developed (Contract 7663/RB/TC) to give advice for problems related to electrical power line for the instruments and systems in a nuclear laboratory or plants. The package helps the user to learn the basics of power conditioning and understand systematically the steps to be taken for proper power conditioning. EPC Expert System package with detailed manual has been submitted to the Agency for evaluation and feedback.

Handbook on Nuclear Medicine Instruments covers wide ranging topics right from basic nuclear electronics to the detailed account of the state of the art technology in nuclear medicine instruments for both invivo and invitro studies. Handbooks were sent to RCA member countries for the nuclear medicine technologists. Bangladesh (30), China (500), Indonesia (50), Korea (200), Malaysia (30), Pakistan (50), Philippines (50), Singapore (10), Sri Lanka (20), Thailand (40), Vietnam (20) and remaining copies to IAEA, Vienna. The plans for 1995-96 are, fabrication, testing and installation of Gamma Camera to PC Interface Cards (32 nos.) and planning for IAEA Inter-regional workshop on Gamma Camera Maintenance to be held in early 1996 at Bombay.

#### **FOOD AND AGRICULTURE**

The two research agreements, i) Hygienization of spices by gamma irradiation (Research Agreement No. IND-5918/CF) and ii) Comparative studies on the efficacy of gamma irradiation, heat, refrigeration and combination treatments as a quarantine treatment for mango fruits (Research Agreement No. IND-5919/CF) under the Coordinated Research Programme have come to an end and the final reports have been communicated to the Agency in 1994.

The Government of India, Health Ministry have recently notified an amendment to Prevention of Food Adulteration (PFA) Act to include the food irradiation as a process for three items i.e. spices, potato and onion for both domestic consumption and export.

Under the Project on Enhancing biological nitrogen fixation in chickpea (Research Agreement No. 6747, FAO/IAEA/UNDP Project RAS/5/021), following work were done:

1. Growth and  $N_2$  fixation of chickpea cultivars: use of A value and  $\delta^{15}N$  methods for quantifying  $N_2$  fixation;
2. Genetic variation for nodulation within chickpea cultivars ;
3. Genetic variation in nodulation and nitrogen fixation in chickpea cultivars;
4. Enhancing biological nitrogen fixation in chickpea.

India hosted the research coordination meeting of the IAEA funded program on "The Use of Isotopes in Studies to Improve Yield and Nitrogen Fixation of Grain Legumes with the Aim of Increasing Food Production and Saving N-fertilizer in the Tropics and Sub-tropics of Asia". Twenty eight scientists (including 11 from ICRISAT, AP, as observers) from ten countries participated.

#### **RADIATION PROTECTION INFRASTRUCTURE PROJECTS**

The radiation protection infrastructure available in this country has been spelt out in detail in the earlier RCA meetings (Tokyo 1987, Tokai 1992 and Beijing 1993). The Radiation Protection Rules of 1971 and Industrial Radiography Surveillance procedures of 1980 are undergoing revision during the last one year. The Atomic Energy Regulatory Board, Competent Authority for Radiation Protection in this country has entered into a memorandum of understanding (MOU) with Council of Scientific and Industrial Research, India. The CSIR has got laboratories located in various cities and towns of India. As per the MOU, scientists of CSIR laboratories will visit the diagnostic X-ray clinics in and around their laboratories and fill a proforma to get the units registered as well as to get the personnel covered under the personnel monitoring services. CSIR scientists had undergone orientation courses at BARC as to what are the things to be looked into while visiting the clinics. So far 80 scientists had undergone the orientation programme in 1994. A new rule on the Registration and operation of Radiation Gener-

ating Equipment under 500 kV is also under preparation during the last one year. This rule enlarges on some aspects of the earlier rule, Radiation Surveillance Procedures for Medical Application of Radiation, 1989 and will tighten the regulations regarding registration of all X-ray units. Atomic Energy Regulatory Board has appointed a review committee consisting of eminent persons in the fields of Factories Act and Labour Laws, Social Sciences, Medical Radiology, Industrial Medicine and Radiation Protection which looks into all cases where accumulated exposures exceed 20 mSv in a calendar year.

To augment manpower and decentralise the protection activities, 9 workshops and 22 training courses were held during the year covering all aspects of radiation protection. The Radiation protection infrastructure in India is on a very sound basis and is constantly being strengthened based on experience. Indian government will be glad to extend its help in sharing the experience with other RCA member states.

#### **ENERGY AND NUCLEAR POWER PLANNING**

Under the project on Effective Strategies for Nuclear Power Programmes an Expert Advisory Group meeting was held during November 1994 at Bangkok, Thailand, in which India had participated. The objectives of the meeting were, identification of the problem areas in the national implementation of nuclear power programmes and to produce guidelines for the preparation of national reports by all the RCA member states; and reformulation of all activities as part of this project on "Effective Strategies for Nuclear Power Programmes in RCA countries. In addition to the funding, there are constraints of finance, public acceptance and infrastructural requirements that affect the programme of nuclear power in varying degrees in the region.

Based on the format and guidelines for preparation of national reports on the experiences in the implementation of nuclear power programme, action has been initiated to prepare the National Report on Indian experiences.

## **INDIA'S EXTRA BUDGETARY CONTRIBUTION TO RCA**

A Regional Training Course on International Nuclear Information System was held during 23 Jan - Feb 3, 1995 in Bombay. India has made a substantial contribution to the INIS database which stores information on all aspects of the peaceful applications of nuclear energy. The Library & Information Services Division of Bhabha Atomic Research Centre is the nodal point for inputting records to INIS from India.

## **JOINT UNDP/IAEA/RCA PROJECT for Asia and the Pacific on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development**

### **NUCLEAR ANALYTICAL TECHNIQUES**

The first National Coordinators Meeting on Nuclear Analytical Techniques sub-project held at Kuala Lumpur decided to hold the first RCA Regional Workshop on this topic in India.

A National Symposium, under the aegis of Indian Society of Analytical Scientists (of which the National Coordinator is the President), on Strategic and Hi-Tech Metals: Extraction and Process Characterisation" with special session in Environmental Impact and Analytical Methods for detection, estimation and recovery of rare and precious metals from the different stages of base metal production processes was organised in March 1994 as part of this sub-project on Nuclear Analytical Techniques. Failure to recover these metals leads to their release into the environment, substantiating the adage "Pollutant is resource at the wrong place"! Coinciding with this symposium, the Department of Atomic Energy, organised, as part of the efforts towards enhanced public awareness, a countrywide essay contest among students, research scholars & teachers on the role of analytical chemistry in environmentally sustainable mineral resource exploration and exploitation.

At the annual meeting of the Indian Science National Congress, which is a major scien-

tific meeting covering a wide spectrum of disciplines, two symposia were organised, convened and chaired during January 1994 & 1995 by the National Coordinator at the instance of the Presidents of the Physics section of the respective sessions in 1994 and 95. The symposium in 1994 dealt with Applications of Nuclear Techniques while the symposium in 1995 was titled "Trace Impurity Analysis: Pitfalls and Precautions".

Atomic Minerals Division of Department of Atomic Energy continued to apply instrumental neutron activation for analysis of several rock and mineral samples as part of their effort towards the understanding for resource prospecting. The Geological Survey of India have set up their own laboratory, about 3 hours drive from Trombay, at Pune, for carrying out regular irradiations at reactors at Trombay followed by measurements, with and without radiochemical separation, in their laboratories at Pune. Scientists in that organisation are now being trained in the determination of Platinum group metals by using a variety of preconcentration techniques. The Institutes of Department of Atomic Energy encourage people from different academic, R&D institutions and industrial organisations to come and work at the Centres for familiarising or gaining expertise in a specific area or in some occasions refreshing their knowledge in a particular area of application.

A National Centre for Compositional Characterisation of Materials has been set up at Hyderabad to provide specialised analytical services to sub parts per billion levels of concentration, validation support to national programmes like environmental sciences, which use different analytical techniques and consultancy to industry for process optimisation and product evaluation.

The major equipment, a 3 MV tandem accelerator for carrying out different types of experiments involving ion beams has been installed; this accelerator will significantly enhance the analytical capability through various approaches of Ion Beam Analysis such as PIXE, Nuclear Reaction Analysis (NRA), particularly involving narrow resonances using "heavy ions" and Elastic Recoil Detection Analysis, ERDA.

The other Facilities in the Centre, particularly the Metal Free Clean Laboratories will

enable reliable quantitative analytical measurements at sub parts per billion levels of concentration, following adequate care in the purification of reagents, choice of container and cross validation by atleast two independent measurement techniques.

### **NUCLEONIC CONTROL SYSTEM AND TRACER TECHNOLOGY**

There are nearly 9000 nucleonic control systems in use in the country. The National Association for Applications of Radioisotopes and Radiation in Industry (NAARRI) has recently been organising special courses on the Safety Aspects of the erection, maintenance and operation of nucleonic control systems.

There were five Indian participants, in the two events conducted by the UNDP/IAEA/RCA Regional Project in Mae Moh, Lampang, Thailand, two in EMS and three in the Workshop. All these participants are directly associated with coal field operations or instrumentation.

A detailed report of the activities of the Tracer Technology and Nucleonic Control Systems has been presented at the recent National Coordinators Meeting in Colombo in February 1995, which highlighted the major activities in this region.

India hosted a UNDP/IAEA/RCA training course on the Application of Isotope Methods in Process Optimisation in November 1994, in which 13 participants from 9 RCA member states participated.

A Tracer Mission consisting of a team of 2 experts visited Bombay during January 28 - February 2, 1995 to assess the status and potential of tracer technology in India.

In our experience the following aspects play important role for an effective implementation of tracer technology programmes:

A well identified and trained tracer group; easy availability of tracers and field equip-



ment; linkages with organisations engaged in amelioration of quality of industrial products and processes; organisation of management appreciation seminars through a National Association devoted to promotion of isotope technology; offer of demonstration service to industry to gain the confidence of industrial personnel; good and positive radiation protection support at all stages.

## **NON-DESTRUCTIVE EVALUATION**

The NDT activities in India are carried out in a very large number of industrial sectors. National Training Courses are conducted for levels I and II throughout the country in national laboratories, academic institutions, training institutes of industrial units etc. The faculty includes practising professionals, staff of academic institutes, scientists from R&D labs. of various research centres. The courses are carried out with active participation of members of professional societies. The certificates are issued by Indian Society for Non-destructive Testing (ISNT). For level III, both the courses & examinations are conducted by ISNT. For radiographic testing, courses and examinations are carried out by Bhabha Atomic Research Centre, Bombay. These are mandatory requirements for procuring and handling of radioisotopes for radiographic testing. Four professionals from India participated in the Regional Training Course on Fabrication of test pieces with defects and for detection of these defects held at Kuala Lumpur during 16-27 January 1995. In addition, many seminars were held at various places in the country and the Annual Technical Meeting of ISNT - "NDE-94" was held in Bombay during December 8-9, 1994, which was attended by over 300 delegates representing about 250 organisations.

The 14th World Conference on NDT will be held in India in December 1996 and preparatory activities covering this major event are in progress. Various chapters of ISNT, throughout India have planned to conduct seminars, workshops and training courses on NDT for managers.

One expert from BARC visited Sri Lanka for a short period for conducting model qualifying examination in Radiographic Testing Level-3 under IAEA assignment. A few expert exchange visits were made on bilateral agreement basis.

New applications of neutron radiography, microfocal radiography formed part of the NDT R&D activities.

It is learnt that IAEA Regional Project in Latin America has included the following two points in the overall objective of the project: i) To introduce new NDT techniques, procedures, standards and equipment resulting from the latest technological activities throughout the world; ii) to develop new NDT techniques, procedures, standards and equipment. Hence it is suggested that in this phase or in the next phase of the project, this topic should also be included in the NDT project of the Asia-Pacific region. For application of NDT in various fields, the drive control systems and their coordination with the NDT equipment with respect to the position of transducers is very important. This is particularly true for in-service inspection in various industrial sectors. Hence it is essential to include this aspect also in the Asia-Pacific NDT Project.

## **RADIATION TECHNOLOGY**

The programme of work in radiation technology is implemented by the Board of Radiation and Isotope Technology in collaboration with BARC, both of which are the constituent units of the Department of Atomic Energy. In addition, R&D support from other research and academic institutions and manufacturing industries is sought for in the development of solutions to specific problems. The experimental approaches adopted include the use of gamma radiation, electron beam accelerator and more recently particle beams from accelerators of medium and lower energy. There are eleven gamma irradiators; the utilisation and the resulting commercial value of these irradiators have increased manifold over the years with the necessary enhancement of source strength.

There are a number of gamma chambers in use in academic and research institutions and we expect to be able to put in the market a new Gamma Chamber 5000 in the near future in addition to upgrading the smaller Gamma Chamber 900 to meet the regulatory demands. A blood irradiator with Cs-137 is also planned to be produced in the next 12 months.

India has installed facilities and developed expertise over the years, for the fabrication of large Co-60 sources needed for the industrial irradiators.

The major applications currently practised in India include sterilisation of medical products, hygienisation of sewage sludge, radiation vulcanisation of natural rubber latex, degradation of PTFE and food irradiation. A gamma irradiator plant for processing spices is to be set up shortly, while a few demonstration level (5 to 10 ton/hour) plants for irradiation of onions and potatoes are planned at the instance of Department of Horticulture. A two day National Workshop on "Food Irradiation" supported in part by IAEA/ICGFI was held at BARC in February 1995.

#### **SUGGESTED ACTIVITIES FOR CONSIDERATION**

Following seminars/workshops are suggested for 1995-96:

- National Seminar on Radiation Vulcanisation of Natural Rubber Latex - 1995 - 1 or 2 experts at Agency's cost.
- Regional Seminar on Barriers & Strategies for Nuclear Power Programme in the Asian Region - 3rd quarter 1996 - from our RCA contribution.
- Next National Coordinators meeting on Nuclear Analytical Techniques at the National Centre at Hyderabad - end of 1996. Several specialists in the area of ultra trace analysis are expected to participate in a Specialists meeting which can be co-located in time along with this National Coordinators meeting.
- Regional CRP on Tribology using thin layer activation approach.
- Inter regional workshop on Gamma Camera Maintenance - Bombay - early 1996.



**COUNTRY STATEMENT OF INDONESIAN DELEGATION  
AT THE SEVENTEENTH RCA WORKING GROUP MEETING  
KUALA LUMPUR, MALAYSIA  
MARCH 27 - 30 , 1995**

**Mr. Chairman,**

On behalf of the Indonesian Delegation I would like first of all to join the previous speakers in congratulating you on your election as Chairman of this important meeting. I do believe, that under your wise guidance and your able leadership this Working Group Meeting will be successful and fruitful results would be achieved.

Indonesia has maintained its active participation in RCA programme since the beginning, and will remain active in the future programme activities of RCA.

May I take this opportunity to express my Delegation's sincere gratitude to the Government of Malaysia c.q. the Malaysian Institute of Nuclear Technology Research for the excellent arrangement of this Meeting. It is my great pleasure to be enable joining this seventeenth RCA Working Group Meeting, here in Kuala Lumpur, the beautiful metropolitan of Malaysia.

I would like to present a brief summary of activities which have been carried out in my country in relation to the RCA Programme, as follows:

**1. Regional Industrial and Environmental Project**

**1.1. Radiation Technology**

1.1.1. One staff from CAIR-BATAN (Mr. Marga Utama) has been recruited as IAEA expert to Philippines under the Project No. Phi/8/013-03 for a three weeks mission to assist the PNRI staff in setting up of gamma rays irradiation facility for RVNRL.

1.1.2. Dr. Mirzan T. Razzak, a staff of CAIR-BATAN has participated at the Regional Seminar on Flue Gas Treatment, held at Takasaki Radiation Chemistry Research Establishment-JAERI, Japan, October 17 - 21, 1994.

1.1.3. RVNRL is routinely produced by CAIR-BATAN based on the utilization of n-Butyl-Acrylate (n-BA) as sensitizer using irradiation dose of 15 kGy. About 1.5 ton RVNRL has been supplied for adhesive company.

1.1.4. Irradiation services for commercial purposes of radiation sterilization of medical products and food irradiation have been transferred to the private owned irradiation facility INDOGAMA since a few years ago. It seems that the quantity of commodity items irradiated by INDOGAMA facility has gradually increased year by year. At the beginning in 1992 only 735 tons have been irradiated and very recently it has reached a figure of about 6,550 tons at the end of October 1994 and a volume of about 27,500 tons is forecasted to achieve at the end of this year.

1.1.5. It seems that plywood industry in Indonesia is not interested using radiation curing technique in their process, although a significant amount of such industries are available in the country. The main reasons why they were reluctant to this radiation curing technology, probably due to the relative high cost of radiation curing process using the existing EPS-300 (300 keV) at CAIR-BATAN, although they believe that radiation curing process would give a significant added value to the product. It should be taken into consideration in this special case, that EPS-300 seems not suitable to be used for commercial purposes of radiation curing of plywood due to the price of liquid nitrogen and imported chemicals is relative high in the country. From the other point of view, the use of EPS-300 for R & D and demonstration purposes seems to be adequate.

1.1.6. Another EBM GJ-2 (2 MeV) installed at CAIR-BATAN is planned to be used for R & D as well as for a pilot scale demonstration plant for crosslinking of wire and cable insulation. Based on a survey done by the staff of CAIR-BATAN, more than thirty cable industries and about 123 electronic industries are available in Indonesia. Some approaches have been made to meet the efficient use of the EBM in the future.

1.1.7. Flue gas treatment technology is rather new for Indonesia, although our country has also problems with coal and oil fired power generators. Therefore CAIR-BATAN has taken necessary steps to introduce this new technology to the respective institutions.

1.1.8. A National Seminar on the Application of Radiation and Radiosotopes has been conducted at CAIR-BATAN, December 13 - 15, 1994. More than eighty scientific papers have been presented and discussed at the Seminar.

1.1.9. A National Seminar on Radiation Processing in Cosmetic and Pharmaceutical Industries will be held at Jakarta, from 24 - 25 January 1995. Dr. Brian D. Ried, an IAEA expert from Nordion International is expected to be available at the Seminar. For 1995/1996 at least two National Seminars on Radiation Technology are planned to be executed.

## **1.2. Non Destructive Examination (NDE)**

1.2.1. NDE programme in Indonesia for 1994/1995 comprises of trainings and seminars. The training programme will be focussed on the training of personnels for level 1 and level 2 specialists of UT, RT and surface methods.

1.2.2. There were three national seminars on NDT which have been conducted in the country for participants from the oil industries, petrochemicals, shipping and aircraft companies, NDT associations and the interested people in this field.

Lacking of level 3 specialists is the main constraints in conducting level 3 training in all NDT methods, so that level 1 and level 2 trainings only have been executed. Therefore my Delegation seriously proposed that training of specialists for level 3 in all NDT methods should be given a high priority in the future training programme of RCA.

1.2.3. For the next National Seminar which is planned to be held in June 1995 with a topic on the Role of NDT Remaining Life Assessment of the Components, At least two experts are expected to be provided by ANSTO and CISE.

1.2.4. As formulated at the Proficiency Testing Programme (PTP) Meeting held in Melbourne, Australia, January 1994, a consensus has been reached that PTP for UT and RT specialist level 2 will be conducted on step wise basis, however, up to present issue on fabrication of test pieces still remains a significant constraint. Indonesia believes that this issue should be completely solved through the assistance provided by the Agency.

1.2.5. My Delegation hopes that a number of NDT test pieces produced by the Regional Workshop on NDT Test Pieces Fabrication in Kuala Lumpur, Malaysia, from 16 - 27 January 1995 could be available for the forthcoming PTP activity in Indonesia.

### **1.3. Tracer Industries and NCS**

1.3.1. A project on sediment movement was carried out at the estuary of Musi river near Palembang harbour, South Sumatera in 1994/1995. Most of the problems remain in the observation of pattern and direction of sediment movement in the area of navigation channel, looking for the proper dumping site and the estimation of the sediment accumulation. Au-198 labelled sediment was used in this project.

1.3.2. Leakage of buried drinking water pipe line has been detected for the first time using Tc-99m in Bontang, East Kalimantan. Losses of water have been determined by peak to peak method. The total distance of the pipe line is about five kilometers.

1.3.3. Verification of geothermal field using environmental isotopes has been executed in South, West, and in North Sumatera. In 1994 no tracer technique has been introduced in oil production. A project on water flood will be carried out in 1995 in Kalimantan.

1.3.4. In the verification of ground water exploitation at Bontang Basin, East Kalimantan, environmental isotopes and radiotracers were used in determination of the origin of water, dating, sea water intrusion, water balance and permeability of the formation in the recharge area.

1.3.5. Radiotracer techniques have been introduced to industries in solving problems of mixing process in paper plant in Bandung and mercury inventory at caustic soda plant in Surabaya

1.3.6. Shielded source activity has been introduced to column scanning in column distillation of Asahimas Subentra Chemical, Cilegon, West Jawa, concrete wall scanning in Jakarta, and scaling in pipe line at Kamojang, West Jawa.

1.3.7. Very recently, BATAN has succeeded in making of thickness gauge prototype and one piece of thickness gauge will be delivered to a paper manufacture, at Padalarang, West Jawa.

#### **1.4. Nuclear Analytical Techniques (NATs)**

During the last two years activities done under the NATs programme are as following:

1.4.1. Validation of instrumental neutron activation analysis procedures for multi elements quantization. The activities were implemented by the analytical laboratories of BATAN. One of the laboratories has taken part in the intercomparison studies on elemental analysis of sulphides mineral using various analytical methods organized by the Research and Development Centre for Geotechnology, the Indonesian Institute of Sciences.

1.4.2. Neutron activation analysis of environmental samples. Neutron activation analysis of airborne particulate matter was carried out under cooperation of BATAN and two environmental agencies, i.e. Environmental Impact Management Agency (EIMA) and Environment Assessment Office (EAO).

1.4.3. Application of nuclear analytical techniques in environmental medicine, which is implemented in cooperation with the Department of Internal Medicine, School of Medicine, University of Padjadjaran in Bandung.

1.4.4. In addition to these activities Indonesia also sent participants to the IAEA Workshop on Environmental & Industrial Applications of NATs in Bombay, India and the Training Course on Gamma-ray Spectrometry in Tokyo, Japan.

The future programme of NATs in Indonesia are as following:

1.4.5. Continuing the neutron activation analysis of environmental samples. Sampling shall be carried out under a "well defined" condition, e.g. the position of the filter relative to the ground level, the environmental conditions during sample collection (wind speed and direction, ambient temperature, humidity), duration of sampling, sampling site (urban or rural areas), etc.



1.4.6. A workshop on the utilization of nuclear analytical and related techniques in elemental quantization of airborne particulate samples will be organized by BATAN in cooperation with the environmental agencies (EIMA and EAO).

1.4.7. In a study on the development of marine pollution, neutron activation analysis will be used to determine elemental composition of coral reef. Formation of coral reef is influenced by environmental conditions. Determination of the elemental composition will make it possible to trace the history as well as the changes in the environmental conditions.

1.4.8. The efficiency of selenium ingestion in Acute Myocardial Infarction and Heart Failure patients will be studied. The efficiency of selenium treatment to selenium deficient patients will be monitored through clinical improvement and healing process of infarction.

1.4.9. As a follow-up of the above preliminary study in Dieng Plateau, further investigation to determine mercury content in blood, water supply and foodstuff taken by the inhabitants will be performed. The aim of the study is to reveal the possible effect and correlation between Lipoprotein (a) and mercury in the environment.

## **2. Medical and Biological Applications of Nuclear Techniques**

### **2.1. Radioimmunoassay for Hepatitis B Diagnosis**

2.1.1. Indonesia has been participating in the TC Project of Radioimmunoassay for Hepatitis B Diagnosis (RAS/6/018) since 1992. Indonesia is one of the countries which has an indication of a high prevalence of Hepatitis B.

2.1.2. Starting from 1994, Indonesia is one of the participating countries which has been supplied by the Agency with raw materials for reagents. Indonesia is recently able to produce all parts of Hepatitis SPRIA Kits (e.g. coated bead for HBsAg and anti Hbs as well as iodinated HBsAg and anti Hbs as tracers and also negative and positive controls).

2.1.3. The product of Hepatitis B reagents produced by BATAN will be distributed to the local participating laboratories for clinical studies. The clinical studies for this year will be emphasized on i). prevalence of Hepatitis B in pregnant mothers and the babies, and ii). prevalence of Hepatitis B in patients with liver abnormalities.

2.1.4. The next programme will be an enhancement in the wide spread application of Hepatitis B reagents locally produced to be tested national wide in Indonesia before a trial introduced to RCA member countries. As stated by the Indonesian Delegation at the sixteenth RCA Working Group Meeting in Bali, March 1994, that Indonesia is going to start with a feasibility study on the production of Hepatitis B kits in the near future. It seems that the idea will possibly come to a reality.

## **2.2.Radiation Sterilization of Biological Tissue Grafts**

2.2.1. At present radiation sterilized lyophilized amniotic membrane and radiation sterilized air-dried amniotic membrane have been routinely produced by CAIR-BATAN Tissue Bank and Sitanala Lepratorium Tissue Bank, respectively. About six to ten pieces of amniotic membranes have been processed weekly at CAIR-BATAN Tissue Bank and about 1,000 pieces of the processed membranes (10 x 10 cm) have been applied at Dr.M.Jamil Hospital in Padang for burn dressing during 1993.

2.2.2. Since 1992 CAIR-BATAN Tissue Bank has introduced the application of radiation sterilized lyophilized cancellous bovine and human bones to Siaga Raya Orthopaedic and RSCM Hospitals in Jakarta. Up to now the CAIR-BATAN Tissue Bank has received and has processed forty six pieces of human femoral heads from Siaga Raya Orthopaedic Hospital and the processed bones have been applied at the same hospital. In 1993 radiation sterilized bones have been introduced to three patients (one patient with AAA cancellous bovine bone and two others with processed human femoral head). The results were promising and none of the patients showed any symptoms of rejection and the growth quality of the new bones are the same as those of the imported ones ex Germany.

The future programme in relation with the project are as following:

2.2.3. Setting-up a Tissue Bank at Dr.M.Jamil Hospital in Padang with equipment expected furnished by the Agency. Around 100 sqm of space and several tools in relation with the setting up of the tissue bank are available.

2.2.4. A part of equipment for Dr.M.Jamil Hospital and for CAIR-BATAN will be supplied by the Agency through a TAC Programme. Equipment for Dr.M.Jamil Hospital Tissue Bank comprises of a freeze dryer, a deep freezer, a laminar flow cabinet, a bone cutter and an electric sealing machine are expected to be available in 1995, while for CAIR-BATAN Tissue Bank the equipment comprises of a freeze dryer, a deep freezer and a bone cutter, hopefully to be provided in 1996.

2.2.5. A six month job training to UK is proposed for Dr.Asril Zahari, a staff of Dr.M.Jamil Hospital. If possible the training is preferred to be conducted at Clwyd Tissue Bank for two months, at Yorkshire Tissue Bank for one month and three months at the Hospital(s).

2.2.6. A four months training in USA is proposed to be provided for Mr.Basril Abbas a staff of CAIR-BATAN at Northwest Tissue Centre, c/o Dr.Michael Strong, Seattle, USA, tentatively in 1996.

2.2.7. Dissemination of information on donor selection and application of surgical grafts to several hospitals in Surabaya and Medan is planned to be carried out.

2.2.8.A National Workshop on Procurement, Preparation and Application of Tissue Grafts is planned to hold in January 1996.

### **2.3.Standardization of I-131 Treatment for Hyperthyroidism with an Intent to Optimize Radiation Dose and Treatment response**

2.3.1.Indonesia has been approved to join the project. Prof.Dr.Nursal Asbiran, Scool of Medicine, Andalas University at Padang, West Sumatera will be the National Coordinator.

### **2.4.Nuclear Instrument Maintenance**

2.4.1. One of the activities of the project is to support the application of nuclear sciences and technology in medicine through preventive maintenance of equipment in the state hospitals, which is performed by BATAN's Nuclear Medicine Equipment Maintenance Team. Other activities in this context to provide technical consultations and suggestions in case the hospitals will purchase new nuclear medicine equipment, and supervising the installation of new nuclear medicine equipment, such as performed in installing the new gamma camera in the Harapan Kita Hospital, in Jakarta.

2.4.2.Two staff of BATAN have participated at the Training Course on Regional (RCA) Workshop on Quality Assurance in Nuclear Medicine Imaging-Hardware and Software Aspects, Bangkok, Thailand, 12 - 16 Decembre 1994.

2.4.3.The future plan is to support BATAN's Nuclear Medicine Equipment Maintenance Team in supervising the forthcoming installation of seven Sophy cameras which have been procured through the Protocol France Gamma Camera Project.

2.4.4.Most obstacles which are facing by the Preventive Maintenance activities occured, due to lacking of end user funding to implement the service contract and secondly due to some staff attended the RAS Project programme are not fully in charge with the maintenance of nuclear medicine equipment.

## **3.Agricultural Projects**

### **3.1.Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen**

3.1.1.Indonesia is not participated in this project, however a sligthly similar activity has been carried by the staff of CAIR-BATAN. Some promising results have been achieved.

### **3.2.Public Acceptance and Trade in Irradiated Food**

3.2.1.Food conservation is very important particularly for the countries in tropical region with a high temperature and humidity. Irradiation process is an important alternative of food conservation to extend the storage life of food and to prevent food from spoilage. The main issue of food irradiation is the public acceptance. If this issue can completely solved in the near future, it is undoubtedly, the trade of irradiated food will have a bright future. And therefore Indonesia strongly support the project.

3.2.2.The Indonesian Health Authority has issued clearance of three groups of irradiated food commodities since the end of 1987 with a decree of the Minister of Health. Clearance has been approved for cereals (maximum 5 kGy), spices (maximum 10 kGy) and tubers/rhizome (maximum 0.15 kGy). A very recent clearance has been issued on 10 February 1995 for two other irradiated foods, namely frozen shrimps and frog legs (maximum 7 kGy) and dried fish (maximum 5 kGy).

3.2.3.In October 1994 a Seminar on Food Irradiation Information was organized by BATAN in collaboration with the IAEA. This seminar was attended by more than hundred participants from various government institutions, universities, mass media and private companies. The purpose of the seminar was to widespread informations about this technology for gaining public acceptance and for promoting its practical applications. One of the recommendations of the seminar was the need to conduct a proper economic feasibility study to support beneficial application of food irradiation. This study will be started this year (1995) under a TAC project supported by the IAEA (INS/5/025). The Agency will provide experts for this study.

### **4.Research Reactor, Energy and General Project**

#### **4.1.Reactor Utilization**

4.1.1. The RSG-GAS and its facilities located at Serpong, Indonesia, which were established as a centre of excellence in Asia and the Pasific Region in 1989, are open to those interested in doing R & D activities based on mutual benefit agreement. This statement was reported by the Indonesian National Coordinator at the RCA National Coordinators' Meeting held in Korea, August 1993.

Starting from 1994, a five year programme of operation, utilization and R & D which will be implementd at the RSG-GAS is outlined as following:

4.1.2. The availabiliy and reliablility of the RSG-GAS will be enhanced to support an optimum utilization safely, by ways : optimizing the O and M schedule, establishing and to develop the operability of irradiation and experiment facilities and the promotion of manpower ability.

4.1.3. Study, analysis, test and development of silicide fuels as a substitute of oxide fuel is expected to be accomplished in 1999.

4.1.4. Computer coach systems for design, analysis and operation of the reactor and its systems are expected to be established by 1997 for supporting the safe and optimum reactor operation and utilization.

4.1.5. A Regional Training Course on Noise Analysis Method and its Application on Research Reactor will be submitted to this RCA Working Group Meeting for approval, for the inclusion in the future program of RCA for 1996. Indonesia is expecting to be host of the RTC and partially of the funding will be borne by the Indonesian Government (especially for local expenses) on top of the Indonesian cash donation stated at the sixteenth RCA Working Group Meeting in Bali, last year.

## **4.2. Energy and Nuclear Power Planning**

4.2.1. RCA Meeting of National Experts on Data Requirements of IAEA's Planning Models for Energy, Electricity of Nuclear Power Planning with Emphasis on the WASP Models was conducted from 12 -16 December 1994 in Jakarta, Indonesia. The meeting was attended by the participants from Bangladesh, Korea, Malaysia, Pakistan, Philippines, Vietnam and Indonesia.

4.2.2. Four participants from Indonesia have attended the RTC on Safety and Reliability Improvements through Optimized Maintenance of NPPs, Daya Bay, China, 20 February - 10 March 1995.

## **5. Radiation Protection Projects**

### **5.1. Radiation Protection Infrastructure**

5.1.1. At present around sixty regulations, including government regulations, presidential decrees and the Director General of BATAN's decrees have been derived from the National Act No.31 of 1964 on Basic Provisions of Atomic Energy.

5.1.2. In 1994 a new decree of the Director General of BATAN's on the safe transport of radioactive materials has been enacted. This decree uses the IAEA Safety Series No.6 (as amended in 1990) as a reference and is stipulated to replace the old one that has been enacted since 1974.

5.1.3. Three other decrees of BATAN concerning the environmental impact management have also been entered into force in 1994. These decrees are in line with the Government regulation and the Ministry of Environment decrees on the same subject.

5.1.4.BATAN has taken any opportunities to send its staff to participate at various occasions of RTC and ITC on radiation protection and related matters. During the last year about ten staff of BATAN have taken part at those courses.

## **5.2.Reference Asia Man**

5.2.1.Indonesia has actively involved in the CRP on Reference Asia Man since the beginning until the final meeting in Tianjin, China, 25 - 29 Octobre 1993. The data obtained from Jakarta, North Sumatera, East Jawa and East Nusa Tenggara were reported and presented at the last meeting. In the survey, the cultural and socio-economic level of each ethnic groups were taken into consideration.

5.2.2.Considering the large area of Indonesia with more than three hundreds ethnic groups live in the country, the available data so far are regarded neither sufficient nor representative of the population . For this reasons research is continued and will include the data from ethnic groups in Jawa and some of the people living in western and eastern part of Indonesia. The research will be financed by the government budget.

## **6.Strengthening Nuclear Medicine. A Distance Learning Project**

A coordination meeting on the implementation of A Distance Learning Project for operators (technologists) of Gamma Camera was held in Jakarta, from 9 - 10 January 1995 organized by BATAN. The meeting was attended by the Country Coordinator for Distance Learning Project, the Supervisors from Fatmawati, RSCM Hospitals, Jakarta and Hasan Sadikin Hospital, Bandung , the Course Coordinator from Royal Prince Alfred Hospital Sydney, Australia and some other staff from BATAN..

The meeting has discussed about the useful of distance learning for operators of Gamma Camera , the syllabus, lectures on the function of a uclear medicine technologist, QA, the roles of the supervisor, country coordinator and teaching strategies.

## **7.INIS**

Indonesia has participated at the Twenty Second Consultative Meeting of INIS Liaison Officers, held in New Delhi, India 26 - 28 April 1994. Decisions and recommendations of the meeting have been circulated to the liaison officers of the member states.

Thank you for your attention.

**Kuala Lumpur, 27 - 30 March 1995**

Japanese Country Statement  
at the 17th RCA Working Group Meeting

Kuala Lumpur, Malaysia  
March 1995

The Japanese delegation wishes to convey its sincere appreciation to the Government of Malaysia for its diligent work in planning, arranging and organizing the 17th RCA Working Group Meeting. The Japanese delegation also wishes to express gratitude for the hospitality that the Government and the people of Malaysia have kindly extended to all the participants.

Japan has been actively involved with RCA activities since it first participated in 1978, and has made both financial and technical contributions as required for RCA projects.

Japan firmly believes that the RCA provides excellent opportunities for each member state to promote peaceful application of nuclear science and technology, and thus, to contribute to economic development and prosperity in this region. The success of effective RCA projects entirely depends on the proper selection of projects that fully meet the needs of the recipient countries and on proper planning and coordination among the IAEA and all the countries concerned. It is also indispensable that cooperation is carried out on the principle of priority. The principle of scrap-and-build also needs to be explored when considering new projects, especially when RCA activities are under budgetary limitations.

Japan places particular emphasis on the development of human resources when participating in RCA activities, as this is one of Japan's basic principles in promoting technical cooperation to the recipient countries. Bearing the above-mentioned principles in mind, Japan has maintained its involvement and support for RCA projects mainly through such activities as hosting seminars, holding meetings for research and coordination, dispatching experts, and receiving researchers and trainees.

1. Proposed RCA Project Activities for 1994

Japan basically accepts the Proposed RCA Project Activities for 1994.

2. Environment Project

Japan strongly supports the Joint UNDP/RCA/IAEA Environment Project, extending both financial and technical contributions. As Japan places emphasis on consideration of the environment, it is committed to continuing its support of Environment Projects to the greatest extent possible in 1995.

Japan's contribution in 1994 to this project includes the following:

In the field of radiation technology, Japan held three regional training courses including workshops on fundamental aspects of radiation technology and environmental applications, on electron beam technology for purification of flue gases, and on radiation processing in industry-process control and dosimetry. Japan sent one expert to the



national seminar held in Thailand and Sri Lanka, two experts to Indonesia and Malaysia, two experts to the Philippines, one expert to China, and one expert to the National Coordinator Meeting held in Viet Nam.

In the field of Non-Destructive Testing, Japan sent four experts to the Proficiency Testing Programme, four experts to the Proficiency Testing Programme Evaluation Meeting, and one expert to the Regional Workshop on Fabrication of NDT Test Pieces.

3. Medical and Biological Applications of Nuclear Techniques

Japan made an active contribution to the Medical and Biological Application Project in 1994, extending both financial and technical contributions.

Japan sent one expert to Korea to attend the Research Co-ordination Meeting for the Co-ordinated Research Programme on Computer-assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix.

Japan continues to contribute to programmes in the fields of nuclear medicine, radiation therapy, and radiation protection by supporting various research contracts, holding meetings and seminars, and dispatching experts.

4. Agricultural Projects

Japan ceased its financial support in 1982 to this Project due to various domestic reasons. Japan wishes to maintain its involvement in this project on a case-by-case basis, through sending experts and receiving trainees.

5. Research Reactor Utilisation Project

As to the Research Reactor Utilisation Project, Japan will consider extending its support on a case-by-case basis.

6. Radiation Protection Projects

Japan has actively supported the Radiation Protection Project, and will continue to make significant contribution placing particular importance on strengthening the radiation protection infrastructures, by hosting meetings and seminars, dispatching experts, and making joint research programmes.

Japan has been actively involved with the sub-project called "Compilation of Analytical, Physiological, and Metabolic Characteristics for a Reference Asia Man", and held a Consultants' meeting to plan for the next research programme on Asian man in 1994.

Japan also hosted meetings on intercomparison of radioactive measurements for environmental samples and calibration of dosimeters and survey instruments for Photons.

7. 1995 Action Plan

Japan basically supports the principle and outline of the 1995 Action Plan.

8. RCA Cost Projections 1995-1996

Though Japan is not yet in a position to confirm the 1995 cost projection in the background documents, it will

continue to extend as much support as possible to RCA activities in 1995.

9. Other Business

(1) Much has been achieved to date by RCA activities thanks to contributions by all the member countries and also the efforts of the IAEA Secretariat and the Coordinators. The role of the Coordinator has become increasingly important as the number of member countries increases and RCA activities have diversified.

Japan commends highly the efforts made by the RCA Coordinators, and expects that a well-qualified successor will be elected to this post. Japan strongly urges that the Coordinator should be accorded treatment befitting for the post.

(2) As RCA activities have diversified and increased, the burden that the Secretariat has taken on has been rapidly increasing.

Japan strongly believes that every measure should be taken to strengthen the Secretariat, as the success of RCA activities is dependent on the Secretariat.

(3) Joint UNDP/RCA/IAEA Project has been carried out successfully, enjoying appreciation by all the member countries. In order to continue this project, UNDP must be convinced on the merits of the project and its strong contribution to the needs and development of the region. Therefore, it would be useful if RCA could provide with UNDP

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supportive materials suitable for this purpose, and Japan would be ready to cooperate with RCA Coordinator and the member countries concerned in preparing such materials.

**Country Statement of the Republic of Korea**  
**The 17<sup>th</sup> Working Group Meeting of RCA Member States**  
**27 - 30 March, 1995 Malaysia**

**Mr. Chairman, Distinguished delegates, Ladies and Gentlemen,**

It is my great pleasure to participate in the 17<sup>th</sup> Working Group Meeting of the RCA Member States here in Kuala Lumpur, and I would first like to congratulate you on your election to chairman of this meeting.

My delegation also would like to express our gratitude and appreciation to the Government of Malaysia and the Malaysian Institute for Nuclear Technology Research for hosting this meeting and for the warm hospitality extended to us.

The Regional Cooperative Agreement (RCA) has played a key role in the promotion of peaceful uses of nuclear science and technology for mutual benefits of this region. We are confident that the activities of the RCA have contributed to providing a wide range of benefits to its member states and to transferring nuclear science and technology to industries.

Over the past several years Korea has maintained active participation in the various RCA projects such as coordinated research programmes, extra-budgetary contribution, etc. Activities under the RCA projects have progressed satisfactorily in the past year and the summary of activities carried out during 1994 by Korea in relation to the RCA programme is as follows:

***1. Regional Industrial and Environmental Project***

A national seminar on process optimization in the chemical and refining industries using tracer technology was held at the Korea Atomic Energy Research Institute on 22-24 March, 1994. Twenty engineers from seven companies participated in the seminar and the lectures were given by four Australian and one Korean experts.

A one day national seminar on the use of tracer technology for treating water resources was held at the Korea Water Resources Corporation on 17 November, 1994. There were 15 participants and the lectures were given by two IAEA experts, Mr. Wandowo and Mr. B. Wiblin, who had visited Korea for the evaluation mission on tracer technology.

An environmental engineer participated in the regional workshop on the use of tracer technology to study dispersion of effluents in surface water, at Kuala Lumpur, 5-21 September, 1994 together with a member of the national tracer group who then joined the group thereafter. He also attended the regional training course on application of isotope techniques in process optimization, in Bombay, 7-25 November, 1994.

A Korean tracer expert traveled with the project long-term expert Mr. Wandowo to Bangladesh, Pakistan, India and Sri Lanka for the IAEA evaluation mission on tracer technology.

The residence time distributions of gas in the irradiation vessel of a small scale electron beam flue gas treatment system were measured using Ar-41 as tracer. The results were applied in designing a pilot plant. As a result of the project activities there were frequent inquiries from local industries concerning the application of tracer techniques in solving their problems.

About 60 units of NCS were newly installed in 12 companies during the last year. Consequently, the total number of NCS in Korea are now 1204 units which have been installed in 376 different companies.

With regard to non-destructive testing, the Korean government supported an organization for a regional training course on industrial application of non-destructive testing and evaluation from 30 June to 21 July last year, in co-operation with the Agency. Fifteen participants from 10 countries in the region attended the course.

With respect to the nucleonic control system, Samsung Heavy Industry Co. is carrying out cooperative research work with the Korea Atomic Energy Research Institute on flue gas treatment technology by EB. In addition to the imported EB machine, the company has installed another (1 Mev 40mA) which

was domestically constructed. An IAEA expert, Dr. H. Namba, visited the company and KAERI to assist with their research activities.

Some research work on the use of radiation for polymeric materials and environmental wastes is being carried out by KAERI, universities, and private research institutes. The project coordinator attended the 2<sup>nd</sup> national coordinator meeting on radiation technology held in Vietnam last November, and 3 engineers participated in the regional events provided by the Agency.

In Korea KAERI and KIGAM (Korea Institute of Geology, Mining and Materials) are using nuclear activation analysis techniques for environmental monitoring and research. Element analysis of the environmental samples collected from urban and rural areas, and the use of standard samples to determine the accuracy of the techniques are being conducted by KAERI as a part of the long-term research project.

The KAERI NAA(Neutron Activation Analysis) team is participating in the regional cooperative research program for utilization of the research reactor on inter-comparison exercises of the Analytical Quality Control Services (AQCS) program of the Agency using nuclear and nuclear related analytical techniques. The team set up the users group network and organized a study circle including industries, universities, and research institutes. They had five meetings in 1994 and organized a seminar on the use of NAA techniques for quality control and assurance of analytical results.

## *2. Medical and Biological Applications of Nuclear Techniques*

The Department of Nuclear Medicine of Seoul National University assembled a radioimmunoassay kit for hepatitis with antigen, antibody and radio-iodinated antigen or antibody delivered by CIAE, China, and the Chinese kit was compared with that of the commercialized ABBOTT kit in view of performance, linearity, sensitivity, response error relationship, etc.

In the field of external quality control for radioimmunoassay for thyroid hormones, some hospitals participating in the project in Korea carried out quality control of T4, T5 and TSH for 54 domestic institutions and institutions in the Philippines in 1994.

The project coordinator visited domestic hospitals which were installed with SPECT cameras where he could carry out QC tests and give consultations and lectures. When the CRP was initiated in Korea in 1984, 48 SPECT cameras were installed in some domestic hospitals and have now increased to 137 in number. Although some medical centers are still not in a position to carry out QC on a regular basis, the number of medical centers adopting this procedure have rapidly increased in Korea.

With respect to radiation sterilization of tissue graft, Korea spurred the establishment of a muscular skeletal tissue bank at Dankuk University with installment of some equipment provided by the Agency. Through consultations by the expert, Prof. Glyn O. Phillips, plans were formulated to set up 5 year programmes for operation of a processing and tissue banking room, tissue reception from donors, preparation of demineralized bone powder, radiation sterilization of biomaterials, surgical application of demineralized bone powder and evaluation of tissue graft.

Korea participated in the CRP on improvement of cancer therapy(phase-II) via computer-assisted planning and dosimetry in the radiotherapy of carcinoma of the uterine cervix and undertook organization of a final research co-ordination meeting of this project at the Korea Cancer Center Hospital of KAERI from 28 to 30 March last year with 10 chief scientific investigators representing 9 countries. In addition to the meeting, Korea hosted a regional training course from 5-16 September last year concerning radioimmunoassay and immunoscintigraphy for the early detection and management of cancer.

### *3. Agricultural Projects*

During 1994, Korea carried out research on the commercial storage of dried red pepper and dried anchovy by gamma irradiation. A private company, Greenpiatech Co., is operating a 450 kCi Co-60 irradiator for radiation sterilization of medical products and additional food items.

Korea participated in a seminar for application of radiation to food preservation held under the auspices of the Japan Radioisotope Association in Tokyo. Additionally, a research paper was presented by Korea at this seminar.



The Korean government authority has approved a total of 18 items for gamma irradiation, and six items of irradiated food were also proposed to the Ministry of Health and Welfare for legal permission in irradiation.

In 1994, Korea participated in the Agency's coordinated research programme on evaluation of consumer acceptance of irradiated spices and dried fishes through market testing and retail sales under research agreement no. 8171/CF.

#### ***4. Research Reactor, Energy based and General Projects***

One expert participated in the regional workshop on research reactor utilization held in Australia from 26 April to 13 May last year. Korea will participate in the Agency's '95-'96 programme which was recommended at the project formulation meeting held at Jakarta, Indonesia in 1993.

Korea constructed a 30 MW multi-purpose research reactor, HANARO, by indigenous design, and it was fuel loaded at the Korea Atomic Energy Research Institute in February 1995. It will be fully used for experiments of nuclear materials, research on basic neutron physics, and for ample production of radioisotopes for medical and industrial purposes.

For the first stage set-up, a high resolution powder diffractometer, a four circle diffractometer, and a neutron radiography facility are scheduled for completion in March 1996. Korea is in a position for allowing these facilities will be utilized to facilitate national and regional training courses concerning the region.

With regard to energy and nuclear power planning, Korea firmly endorsed the extra-budgetary contribution to this project which was committed at the 16<sup>th</sup> RCA working group meeting in Bali in support of \$200,000 distributed from 1994 to 1997. In this regard, Korea strongly supports the 5 year programme prepared by the Agency based on the project formulation meeting in Indonesia in 1993 and the recommendation from the expert advisory group meeting on effective strategies for nuclear power programme implementation among RCA countries arising from the Bangkok meeting last year.

Korea will undertake an organization of RCA workshops on effective strategy for nuclear power programmes which will be held from 12 to 15 June this year at the Korea Atomic Energy Research Institute in co-operation with the Agency.

### ***5. Radiation Protection Projects***

Since 1987 Korea has participated in this project relating to development of radiation protection infrastructure and related research activities. During 1994, three experts attended the regional events such as training courses and workshops. To fulfill this project, Korea will offer strong participation to off-site emergency, dosimetry, Reference Asian Man, regulations, training and education.

Korea has re-designated the chief scientific investigator of Reference Asian Man and will actively participate with CRP in the project for work on the collection and generation of physical, anatomical, physiological and metabolic human parameters, continuing the development of the human model. The investigator set up a series of reference values for body dimensions and body composition.

### ***6. Korea's Extra-budgetary Contributions to the RCA***

Since 1988 the government of Korea has assisted in a regional training course annually as an extra-budgetary contribution to RCA. In addition to the financial support to energy and nuclear power planning, Korea is willing to propose the organization of a regional training course on probabilistic safety assessment and industrial application from 13 October to 3 November 3, 1995 in co-operation with the Korea International Cooperation Agency and the International Atomic Energy Agency.

The training course is comprised of lectures on general concepts of PSA and risk, use of PSA in NPP design and operation, PSA in periodic safety reviews, acceptance criteria for PSA applications, optimization of safety self assessment, application to nuclear waste disposals, site lectures and technical

visits. Each member state in this region is invited to nominate participants for this regional training course.

### ***7. Conclusion***

Korea's participation in the RCA programme over the years has been very satisfying and productive. Korea believes that the technical cooperation, regional expertise, and infrastructure developed as a result of the RCA provide significant benefits toward regional prosperity and understanding.

Thank you.



**Country Statement of Malaysia**  
**The Seventeenth RCA Working Group Meeting,**  
**27 - 30 March 1995, Kuala Lumpur, Malaysia**

The Malaysian delegation wishes to express its sincere gratitude to the RCA Member States and the IAEA for kindly agreeing to have the Seventeenth RCA Working Group Meeting in Kuala Lumpur. It is indeed an honour for Malaysia. It has been nearly thirteen years since Malaysia last hosted the RCA Working Group Meeting in 1982.

Malaysia has actively participated in almost all of RCA activities since its inception in 1975. We believe that the RCA programme will continue to be one of the useful and important vehicles for promoting peaceful uses of nuclear technology in the field of industry, agriculture, medicine and safety in the region. Since 1975 Malaysia has contributed in-kind to RCA activities and began to contribute her extrabudgetary during the third phase of RCA/UNDP Industrial Project. We hope that the extrabudgetary support by the donors including the UNDP for this programme would not diminish.

The summary of activities carried out during 1994 in relation to RCA programme is as follows:

**1. RCA/UNDP Industrial and Environmental Project:**

In the field of **Non-Destructive Testing (NDT)**, a concerted effort by the **Malaysian Institute for Nuclear Technology Research (MINT)**, the **Standards and Industrial Research Institute of Malaysia (STRIM)**, the **National Vocational Training Council (NVTC)** and the **Atomic Energy Licensing Board (AELB)** in the implementation of national activities and programmes has resulted in a safe as well as systematic and efficient practice of such activities in Malaysia. This technique has been widely accepted and recognized by most industries and government agencies in Malaysia. To date more than a thousand practitioners have been trained and certified under the national NDT Qualification and Certification Scheme, in accordance with the ISO

9712 requirements. Since January 1994, a total of 21 training courses in the field of radiography, ultrasonics, magnetic particles and liquid penetrant were conducted by MINT.

Now the Industrial sector is beginning to recognize the importance of coating inspection subject, especially in oil and gas industry. MINT has organized a National Course on Coating Inspection in Oil/Gas Industry from 5 -10 December 1994 with the assistance of an IAEA expert. Efforts are being made to pursue a new application of NDT, in particular applications for non-metallic materials. In this matter experts assistance has been requested through the IAEA/TC project MAL/8/003 to assist MINT in conducting training courses, seminars and to assess the balance between industrial status and NDT requirements in Malaysia.

With regard to regional production of test pieces, Malaysia hosted the Regional Workshop on the Fabrication of NDT Test Pieces (16-27 January 1995) and the Regional Seminar on the Evaluation of NDT Test Pieces (23-27 January 1995). These activities were jointly organized by MINT and SIRIM, Malaysia participated in RCA/IAEA/UNDP Proficiency Testing Programme (PTP) Evaluation Meeting held 26-28 January 1994, Melbourne, Australia.

As for **Tracer Technology**, the Malaysian industries responded positively towards the applications of these techniques in the area of process optimization and environment. To meet the demand of the industries, Malaysia through MINT established a pool of nuclear scientists specialized in the management of the applications of tracer/sealed source of radioisotopes, as well as for planning and executing tracer/sealed source research. Malaysia hosted the Regional Workshop on Use of Tracer in Surface Water Effluent Studies 5 - 21 September 1994. A one day seminar and demonstration on the use of radioisotopes Kr-85 for gas flow rate measurement was also held in June 1994. Apart from that, Malaysia is willing to host the Regional Field Demonstration on Use of Tracer Technology in Surface and Ground Water in 1996.

Most of the research carried out in the field of **Radiation Technology** is the continuation of the previous phase of UNDP/RCA/IAEA Industrial Project such as radiation curing, radiation sterilization, radiation crosslinking of wire and cable and RVNRL. MINT is strongly involved in research on **EB and UV** curing of surface coating. Under the bilateral UTN/JICA, a seminar and workshop on surface finishing by radiation curing technology were organized jointly by MINT/JICA/IAEA 7-9 September 1993. This seminar covered a wide range of topics which include curing of printing inks, electronics and wood based products. There was overwhelming response from industry. The printing industry in Malaysia is the largest user of UV curing technology Malaysia followed by the electronic industry. However, the application of radiation curing in wood based industry is rather small. Nonetheless, the number of companies who are using UV radiation for during of coatings in wood based industry has increased from four in 1993 to ten in 1994. MINT continues to promote the use of radiation curing in various sectors of our industries.

With respect to **Radiation Sterilization**, irradiation of medical products by gamma irradiator is progressing very well. The gamma plant located at **MINT** was awarded ISO 9002 in 1992 and is providing irradiation services to local medical product manufacturers in Malaysia. This technology has been transferred to local industry whereby a private gamma plant was established last year. Beside providing services, MINT is also carrying out research on radiation compatible materials in order to provide technical advice to the manufacturer of medical products. Work is also being carried out to study the sterilization technique by using electron beam accelerator. Malaysia has participated in a series of regional training courses on radiation sterilization - validation, routine control and application of ISO which was held in 1993 and 1994 in Bangkok, Thailand.

With regard to regulations in radiation sterilization of medical products, Malaysia is following the WHO Guidelines under the title "Good Manufacturing Practices for Pharmaceutical Control Bureau, "Ministry of Health". However, at present, the Bureau has no guidelines for radiation sterilization of medical products and devices. Radiation sterilization is however, included as integral part of GMP Guidelines. In order to harmonize the national radiation sterilization guidelines, MINT has established a working group comprised of representatives from Ministry of Health (GMP), STRIM (ISO), and MINT to look into the current national standards and guidelines for industrial sterilization of medical products and devices. Malaysia is willing to host a RCA/UNDP/IAEA regional Training Course on Industrial Sterilization - Regulation, Standards and Enforcement 7 - 11 August 1995.

In the field of **Radiation Crosslinking of Wire and Cable Insulation**, the availability of high energy Electron Beam Accelerator (NHV 3.0MeV.30mA) has enabled research on material development of radiation crosslinkable polymers to be carried out. Most of the work is being performed with the collaboration of local manufacturers of wire and cables. It is hoped that the wire and the under beam handling system will be installed by middle of 1994 to accelerate the R&D of radiation crosslinking of wire and cable. The system will also be offered to the industries for irradiation services. A few companies have indicated their intention of irradiating PVC wire and cables. A National Executive Management Seminar cum workshop on Product Development of Radiation Crosslinking of Wire and Cables is planned to be held at the end of 1994 after the installation and operation of the under beam handling system.

As Radiation **Vulcanization of Natural Rubber Latex (RVNRL)**, a pilot plant irradiator for RVNRL will be constructed at MINT to promote the exploitation of RVNRL in Malaysia. Current problems on protein allergy and nitrosamine level of natural rubber products in Europe has promoted Malaysia to expedite and enhance her R&D and commercialization of RVNRL. MINT is committed to develop the RVNRL



technology and is in the process of constructing a pilot plant for RVNRL. A pilot plant of the capacity to produce 6,000 cubic metres/year of RVNRL at 1.0 MCi is expected to be commissioned in December 1995. Several local and overseas companies are currently cooperating with MINT in developing the applications of RVNRL, product testing as well as the market acceptability of the products. MINT plans to organize an International Symposium on RVNRL in middle of 1996.

With regard to Nuclear Analytical Technique, Malaysia participates in the RCA Co-ordinated Research Programme on Applied Research on Air Pollution Using Nuclear-Related Analytical Techniques. The studies were undertaken in collaboration with other research organizations, for example for marine pollution study, the participating organizations include our institute, Department of Marine Sciences and Chemistry, National University, Department of Fisheries, Agricultural University and Institute Fisheries Research.

## 2. Medical and Biological Applications of Nuclear Techniques

Malaysia participated in five projects in the field of medical and biological applications of nuclear techniques. The project on **Radioimmunoassay for Hepatitis B Diagnosis** is conducted by Clinical Diagnostic Laboratory, University Hospital, University of Malay (UM), in collaboration with Institute for Medical Research (IMR), University Science of Malaysia (USM), Kelang General Hospital (KGH) Medical Microbiology (MML) of University Hospital. The Clinical Diagnostic Laboratory has implemented the new techniques of quality control of the immobilized antibody and the reagents were used to embark on the detailed study of effect of antenatal infection on foetal development, borderline hepatitis B positive cases, blood products (using our novel sensitive re-equilibration immunoassay methodology). The finding was reported in the third national Coordinators Meeting in 1994. This laboratory has also planned to venture into the production of some of the raw materials i.e. monoclonal antibody so that the future local development of radioimmunoassay technique for hepatitis B can be sustained.

With regard to the project on **Radiation Sterilization of Tissue Grafts**, two tissue banks have been established, acting as a national and research tissue bank located at USM and MINT respectively. Both Tissue Banks have begun implementing total quality system (TQM) into the management of the banks. As a result, the National Tissue Bank (NTB), USM was inaugurated on November 5, 1995 marking the introduction of a tissue banking concept into our medical health-care sector. As for MINT Tissue Bank, with TQM in place, it has started collaborating with three medical centres in Solangor i.e HKL, UM and UKM in the procurement, processing and radiation sterilization of bone grafts.

MINT Tissue Bank (TB) is now assisting the centers in establishing their own bone banks in the near future. By the end of 1994, both tissue banks have produced routinely more than 3000 pieces of human amnions (average size 10x10 cm) which have been used in R&D and in treating almost 200 patients mainly burn cases. As for bone grafts, both banks have produced nearly 400 packages of human and bovine bones which have been used in 10 patients either for orthopaedic or maxillofacial surgery. The banks will soon be producing processed animal skin.

All R&D activities are supported by the national research grant i.e. IRPA and the IAEA Technical Assistance. R&D in cost-effective processing and radiation sterilization are expected to be completed by the end of 1995 and the results will be shared at regional level (during any regional workshops or APASTB meetings). Hydrogel produced by MINT TB will be clinically tested at NTB USM. Human skin cells cultured on gamma irradiated or chemically treated TBT cells are still being pursued by MNT TB and NTB USM respectively for treating deep burns.

With respect to the project on **Care and Maintenance of Nuclear Instruments**, Malaysia hosted the Regional Workshop on Upgrading of Gamma Camera on 4 - 22 September 1994 at the USM Hospital, Kelantan. A total of 17 participants from 11 Asian countries including Malaysia attended the workshop. Four experts from United Kingdom, China, India and Serbia were invited for the workshop. The workshop has successfully introduced to the RCA member states representatives the model of software and hardware to be connected to analogue gamma cameras. MINT has carried out a survey on the quality control and maintenance activities on gamma cameras and SPECT systems in Malaysia for the promotion of national and regional associations of gamma camera users. Malaysia participates in the CRP Project on Research and Certification of Quality Control and Preventive Maintenance of Instruments in Nuclear Medicine Centre. Malaysia hosted the Research Coordination Meeting for this project 20-22 March 1995.

With regard to **Strengthening Nuclear Medicine in RCA Countries, A Distance Learning Project**, Malaysia organized a national Workshop on Distance Learning Project for Nuclear Medicine Technologies 12 - 13 January 1995 with the assistance of an expert from Australia.

### 3. **Agriculture and Food**

Under CRP on the use of Isotopes in the **Studies to Improve Yield and Nitrogen Fixation of Common Grain Legumes**, Malaysia participates in the project Improvement of grain legume - Rhizobium Symbiosis to fix Atmospheric Nitrogen. In 1994, N transfer studies were initiated to estimate the amount of N fixed by the groundnut and which would be available for the next growing crop. The productivity of the five selected groundnut varieties viz MJ 40/42, MJ 20/165-5, Mat Jan, Mkt 1, and RRIM MJ 30/150 grown as intercrop under immature were also assessed. Malaysia will be hosting Terminal Tripartite Review Meeting for the UNDP funded project on "Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes " on 31 March 1995.

With regard to **Food Irradiation**, Malaysia participates in the Food Irradiation Process and Acceptance; Public Acceptance and Trade Development in irradiated Foods. To date, Malaysia has not carried out commercial food irradiation. Under the Malaysian Food Act 1983 and Food Regulation 1985, food companies wishing to irradiate food or importing irradiated food for local consumption need to get approval from the Ministry of Health. Malaysian Standard on the Guidelines for Irradiation of Food has been prepared to facilitate commercial application and efforts are being geared towards improving the irradiation of specific food commodities to be incorporated into the existing regulation.

Malaysia participates in the **RCA Regional Project on Increasing Crop Yields in the Tropics of Asia and Pacific through Agroforestry**.

#### **4. Radiation Protection**

With regard to the **Strengthening of Radiation Infrastructure Project**, Malaysia hosted the National Co-ordinators Meeting and Mid-Term Review for Radiation Protection Infrastructure Project 20-24 March 1995. Malaysia also participated in the Expert Advisory Group Meeting on Radiation Protection Infrastructures, Melbourne, Australia 14 - 18 February 1994 followed by the Expert Training Workshop on Preparation of Off-Site Emergency Plans and Counter Measures, Australian Laboratories, Melbourne, Australia 21 - 25 February 1994 and Expert Meeting of Intercomparison Programme of Radioactivity Measurement for Environmental Samples, 21 - 25 February 1994, Tokai, Japan.

Malaysia has participated in almost all radiation protection activities scheduled for 1994 under this project. One area Malaysia has specifically developed interest is in upgrading the quality assurance of radioactivity and radiation dose measurement, and as a matter of fact, this is part of our long term programme to make all

laboratories in Malaysia comply with the ISO requirements and to be adopted under the accreditation scheme. We have built an additional new building in MINT which houses more environmental and dosimetry laboratories and facilitates, and this programme on quality assurance is further facilitated through our participation in the Meeting on Intercomparison of Radioactivity Measurements for Environmental Sampling in Tokai, Japan in February 1994 and in the Workshop on Calibration of Dosimeters and Survey Instruments for Photons, in Tokai-mura Japan in December 1994.

In line with new recommendations of ICRU for external radiation dosimetry, Malaysia through its national SSDL in MINT, is upgrading its capability to make future standard measurements in air Kenna instead of exposure, as currently being practiced in many countries. Our participation in the Regional Workshop on External Dose Assessment Techniques in Talyuan China in July 1994 is very useful and valuable in guiding us to the right approach on this matter.

There were some technical problems which made Malaysia decide to withdraw from active participation in the first phase of CRP on Standard Asian Reference Man in 1993. However, these problems have been resolved and beginning this year Malaysia is again participating in the second phase of the project with current emphasis given to the study of trace elements in food and tissue.

There is on going project on preparation of national emergency plan and procedures to cater for radiological accident in the country. The draft plan is ready for comment by relevant agencies involved with management of accidents and emergencies in the country. Malaysia sent one senior person to attend the Workshop on Preparation of Off-site Emergency Plans held in Australia in September 1994 who will be directly involved in the implementation of the project.

Malaysia feels that it has gained a lot of advantages by participating actively in the RCA project on Radiation Protection. It will continue to support and get directly involved in future activities of the project scheduled for 1995, 1996 and 1997 in order to further strengthen radiation protection programmes in the country.

#### **5. Research Reactor Utilization and Energy-Based Project**

The first phase of the **Research Reactor Utilization Project** from 1990 to 1993 as well as the associated CRP activities have contributed to the upgrading of the level of knowledge and expertise of MINT personnel in areas relating to the operation, management and utilization of research reactor facilities in the region and raised the utilization of these reactors.

In the field of **Energy and Nuclear Power Planning**, during the first phase activities have contributed to the upgrading of national energy planning tools and methodologies in Malaysia whereby a self-sufficient core group of expertise on the use of WASPS, MAED and ENPEP have been established within Tenaga Nasional Berhad (TNB). However, with the privatization of TNB, it is recommended that the new alternative core group of expertise be established within the Malaysia public sector with active participation from MINT.

Finally, the Malaysian Delegation would like to reiterate our strong support for continuous participation in RCA activities and appreciation to the IAEA, donors and all RCA Member States for the successful implementation of RCA programme.

**COUNTRY STATEMENT OF MONGOLIA**  
**17TH RCA WORKING GROUP MEETING**  
**KUALA LUMPUR, MALAYSIA; 27-30 MARCH 1995**

Mr. Chairman, Distinguished delegates, ladies and Gentlemen,

Mongolia is happy to participate in the 17th RCA Working Group Meeting and I would like to congratulate you, Mr. Chairman, on your election as chairman of the meeting.

On the behalf of the Mongolian Government I would like to express my gratitude to the Government of Malaysia for hosting this meeting and for the warm hospitality.

Mongolian delegation also would like to express our gratitude to the IAEA, UNDP, Donor Countries and RCA member countries.

Our country is participating over two years in the RCA activity. During this time we are joined about 10 RCA Projects on the use of Nuclear technology for industry, medicine, biology, food and agriculture and we are paying more attention to the joint projects of UNDP/IAEA/RCA.

We consider that RCA plays important role for utilisation of nuclear technology and radioactive sources in the national economy of the member states, to train specialists and we are going to participate more actively in future to joining into more projects.

Now I would like to report on the projects:

**NON DESTRUCTIVE TESTING**

NDT activity in our country was directed to implement the decision of first Co-ordinators meeting, held in Tokyo 1993.

In the Mongolian Technical University a NDT training was started for NDT specialists and students of engineering sciences at the Radiographic Testing Laboratory. Some NDT works is been done in the laboratory, namely, radiographic examination of steel reinforcement weld in the Sport Complex of Ulaanbaatar and improvement serviceability of radiographic sources in the Electric Power station No.4 and choosing NDT technique for controlling oil storage tank floor.

National standard for Qualification and Certification NDT personal was developed according to the ISO 9712:12 document and confirmed by National Standard Authorisation and Metrology Centre for acting since January 1995.

Radiographic Testing National training course Level 1 was organised in January 1994 and 10 of specialists participated and received the Certificate level 1.

One RCA expert visited for evaluation NDT status and specific industrial needs of Mongolia, organise national seminar on NDT, consult future application of NDT methods and strengthening NDT manpower.

One specialist participated in the regional training course on the Industrial Application of NDT and Evaluation, held in June 1994, Taejon, Korea.

## **NUCLEONIC CONTROL SYSTEMS APPLICATION**

Under auspices of UNDP/RCA/IAEA Projects RAS/92/073 and RAS/8/069 the National Seminar on Applications of Radioisotope Techniques to the Coal and Mineral Industries was held on 29 October to 9 November 1994 in Ulaanbaatar. The aim of the Seminar was to describe the applications of nucleonic control systems to the coal and mineral industry with special references to the scientific principles, the current status of the technology, possible applications in Mongolia and potential economic benefits. About 25 participants were invited from coal and mineral industries.

In the framework of the Seminar there were organised the inspection to the No.4 Power station in Ulaanbaatar and the technical visit to the Copper/molybdenum mining and enriching complex at Erdenet.

During 1994 our specialists participated in the regional training courses and workshops organised by the project UNDP/RCA/IAEA: Regional Workshop on the Application of Nucleonic Control Systems to Coal Processing Operations, Mae Moh, Lampang, Thailand, 28 November-9 December 1994 and UNDP/RCA/IAEA Regional workshop on the use of tracer technology to study dispersion of effluents in surface waters, Kuala Lumpur, Malaysia, 5-21 September 1994.

## **NUCLEAR ANALYTICAL TECHNIQUES**

Last year a National programme has been initiated for development of Nuclear Analytical Techniques (NAT) applications in Industry, Natural resources exploration, Environmental Research and Monitoring.

The main activities were as follows:

- To develop the NAT for Environmental Studies to determine toxic heavy metals in water, air, soil and foodstuff samples;
- To develop the Gamma Spectrometry Techniques for Environmental Studies to the Radioactivity Analysis and to join Regional Intercomparison of Standard (Reference) Materials Analysis.

Two our specialists were participated in the UNDP/RCA/IAEA Regional Workshop on Environmental and Industrial Applications of Nuclear Analytical Techniques, Bombay, India, 24 January-11 February, 1994.



## **NUCLEAR INSTRUMENTS MAINTENANCE RAS/4/008**

Mongolia supports RCA programme on maintenance of Nuclear medicine Instruments and programme for QA and QC.

We have created a national programme for introducing QA and QC in Nuclear medicine. We hope to obtain new (Second Hand ) Gamma Camera, with assistance of RCA and IAEA. We have applied the IAEA TC project MON/6/005 (Phase I) on the installation of gamma camera. This project was approved, but not implemented because of lack of donor. We would like to ask the co-ordinator to support this project.

One specialist from the First State Hospital was participated in the regional Training Course on the Use of Computers in Nuclear Medicine in Sedney, Australia. 31 October - 2 December.

## **DIAGNOSIS OF HEPATITIS B BY RADIOIMMUNOASSAY**

The National Co-ordinator participated in the National Co-ordinators Meetings in Colombo, Sri Lanka, July 1993 and in Sydney, Australia, October 1994. Our specialists participated in training courses on Preparation of Radioimmunoassay reagents for Hepatitis B Markers, 26 April -8 May 1993, Beijing, China, and on Radioimmunossay and Immunoscentigraphy for the Early Detection and Management of Cancer, Seoul, Republic of Korea, 5-16 September 1994.

We are regularly receive diagnostic kits for Hepatitis B virus surface antigen (HBsAg) and anti-HBsAg from China Institute of Atomic Energy. RIA techniques for Hepatitis B have been successfully assimilated and tested for the prevalence of above mentioned markers during 1994 around 2500 of patients. These persons consisted of hepatitis-infected blood donors, healthy people etc. 17.4% of all screened people were positive for HBsAg demonstrating that Hepatitis B incidence is still high in Mongolia. In this regard it is to emphasise that it is necessary to continue this project in Mongolia 1995-1996 until we could produce own kits.

## **STRENGTHENING OF RADIATION PROTECTION INFRASTRUCTURE**

Our specialists were participated in the Advisory Meeting on Intercomparrison of Radioactivity Measurements for Environmental Sampling, Tokai, Japan, 21-25 February 1994, Regional Workshop on Off-site Planning and Counter Measures for Radiological Emergencies, Mount Macedon, 12-16 September and Sydney, Australia, 19-23 September and Regional Workshop on Calibration of Dosimeters and Survey Instruments for Photons, Tokai, Japan, 28 November-2 December, 1994.

Also On the RAS/92/073 project our delegation was participated in the National Counterparts Meeting for the Joint UNDP/RCA/IAEA Project for Asia and Pacific on the

Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development, ANSTO, Lugan Heights, Australia 28-29 April, 1994, and Tripartite Review Meeting for the Joint UNDP/RCA/IAEA/ Project, Sydney 3 May 1994

- Our country suggests to organise one of the National Co-ordinators Meeting in Mongolia and one training course or seminar in Mongolia, but we will need some financial support from RCA for last case.

Finally I would like to express our appreciation to the government of Malaysia and the National Atomic energy Agency for hosting this 16th Working Group meeting and also I would like to thank RCA, IAEA for their kind support and assistance our country.

Thank you.

## **COUNTRY STATEMENT FOR NEW ZEALAND**

### **17th RCA WORKING GROUP MEETING KUALA LUMPUR, MALAYSIA, 27-30 MARCH 1995**

It is with great pleasure that I represent New Zealand at this Working Group Meeting, especially as this is the first such meeting which New Zealand has attended.

I wish to record my thanks to the Government of Malaysia and to officials of the Malaysian Institute of Nuclear Technology Research for organising the meeting and for their hospitality.

It is also appropriate to express my appreciation to Dr John Easey and his colleagues in Vienna for their assistance over the last 18 months during the process of joining the RCA and their patience in explaining the more subtle aspects of how the Agreement actually works in practice.

#### **General Comment**

New Zealand was one of the early members of the IAEA, but until July 1994 it had stood apart from the Regional Co-operative Agreement for Asia and the Pacific.

New Zealand has watched with interest as the RCA has grown in size and influence. We are impressed with the practical emphasis of the work of the RCA and its determination to measure its success through the delivery of clear outputs designed to add strength to the technological base of the countries within the region.

New Zealand has no nuclear reactors for power generation and none are likely in the foreseeable future. This has led to decisions not to go ahead even with small scale reactors for training or research purposes. Therefore, New Zealand can only contribute peripherally to projects based on research reactor utilisation and on energy and nuclear power planning.

We do have a nuclear science research community based around accelerator technology, radioisotope and stable isotope tracers, and small radiation technologies for industrial scanning. Our hospitals make sophisticated use of nuclear techniques

in medical diagnosis and therapy. Overseeing the safe use of these peaceful applications of nuclear technologies is an effective radiation protection infrastructure. It is in these areas that we anticipate that New Zealand will contribute to and benefit from the RCA.

As New Zealand has only just commenced its activities within the RCA, the remainder of this Statement is a brief outline of intentions rather than a report on completed activities. It also reflects the fact that the impetus for New Zealand's efforts to join the RCA has come from the Institute of Geological and Nuclear Sciences Ltd. (GNS). GNS is the premier provider of research and services in nuclear science in New Zealand and it has been relatively simple to identify topics which are of joint interest to GNS and RCA. However, I am pleased to report there is already participation by the National Radiation Laboratory, which is the competent authority for radiation protection; the NZ Non-Destructive Testing Association together with the Certification Board for Inspection Personnel; and medical researchers in the field of nuclear medicine and instrumentation. I expect this nation-wide commitment to RCA projects to grow as the work of the RCA becomes more widely known.

### **UNDP/IAEA/RCA Project**

The title of this project "The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development" captures the intent of most nuclear science research in New Zealand. The promotion of techniques in the UNDP priority areas of environment, employment creation, poverty alleviation and women in development reflect quite accurately New Zealand's policy objectives both domestically and within the region.

I am pleased therefore to confirm that New Zealand intends to make an extra-budgetary contribution to the UNDP/IAEA/RCA project during 1995.

GNS will be able to contribute strongly to several sub-projects within the UNDP project. Examples of our substantial experience in Nucleonic Control Systems and Tracer Technology includes the use of tracers in underground geothermal systems, the detection and movement of sources of environmental pollutants, and portable

imaging methods for industry. New Zealand has four small research accelerators which are being used for Nuclear Analytical Techniques such as PIXE, PIGME, Rutherford Backscattering, etc. GNS scientists contributed to the recent National Co-ordinators' Meetings on Nuclear Analytical Techniques and on NCS and Tracers.

New Zealand has been gamma sterilising medical products and veterinary medicine containers for 30 years. Heat-shrink film has been manufactured using industrial accelerators for a similar period. However, none of the more recent advances involved in the industrial Radiation Technology sub-project (e.g. vulcanisation, flue gas technology) have been adopted nor, at present, does interest in new technologies appear great. In contrast, Non-Destructive Evaluation is finding increasing use in industry.

#### **Other Projects**

The National Radiation Laboratory (NRL) is responsible for the safe importation, transport, storage and use of radiation sources in New Zealand. NRL will be participating in the project on Radiation Protection Infrastructures, and will be making available its primary standard. The Director of the Laboratory participated in last week's NCM in Malaysia.

We have not yet been able to explore fully the medical and agricultural projects of the RCA. Nuclear medicine specialists have signalled their intention to become involved in RCA projects and we hope that interest in other medical projects will be forthcoming. For a country that has an economy still based mainly on agricultural exports, it is surprising how little nuclear science has been applied in this area. It may be that New Zealand's contribution will be best made through its general expertise in agricultural science.

## **Conclusion**

New Zealand is pleased to have finally joined the RCA. We expect to be active in the UNDP project and in the development of radiation protection infrastructures and medical applications of nuclear science. I look forward to next year's meeting and the opportunity to inform other member countries of the initiatives that have been taken during 1995.

**COUNTRY STATEMENT - PAKISTAN**  
**FOR**  
**17TH RCA WORKING GROUP MEETING**  
**KUALA LUMPUR, MALAYSIA FROM 27-30 MARCH, 1995**

Mr. Chairman, distinguished delegates, ladies and gentlemen.

My delegation would like, first of all, to congratulate you on your election as Chairman of this Working Group Meeting. I believe that under your able guidance this important meeting will be successful and fruitful results would be achieved.

It is my great pleasure to participate in this 17th Working Group Meeting of RCA Member States. On behalf of the Pakistan delegation, I would like to express my deep appreciation to the Government of Malaysia for its diligent work in planning and hosting this meeting and the warm hospitality extended during our stay in Malaysia.

My delegation is very happy to state that RCA is an effective instrument of regional co-operation between all member countries in South East Asia and the Pacific over the past 20 years of its existence and we do believe that it will continue to play a useful role in promoting peaceful uses of nuclear techniques in industry, agriculture, biology and medicine.

May I recall that Pakistan has actively participated in almost all activities in the framework of RCA since 1974 and will maintain its active contribution in the future RCA programmes. I would like to take this opportunity, to briefly report on the activities carried out in Pakistan during 1994, as follows:-

**1. Industrial Projects**

The emphasis on making the application of nuclear techniques in the industry and environment problems is being made in Pakistan through the RCA activities under Joint UNDP/IAEA/RCA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development. The above UNDP Project has

progressed well therefore, Pakistan would stress that UNDP may continue to provide financial support for activities in all the four areas of this project i.e. Non-Destructive Evaluation, Radiation Technology, Tracer Technology and Nucleonic Control Systems.

### **1.1. Non-Destructive Testing**

The development of non-destructive testing is making a steady progress in Pakistan. Most industries and the government organizations seem to be getting well aware of the needs for inspection, testing and quality control using NDT methods. PAEC is continuing training of personnel in non-destructive testing techniques (NDT). Fourteen industrial concerns in the private sector and thirteen national organizations in public sector have benefitted from various courses in NDT in ultrasonic testing, surface methods, radiography and liquid penetrant testing. During 1994, eight such courses were organized in Islamabad which were attended by 129 participants. National Centre for Non-Destructive Testing is expected to start functioning during 1995.

National Co-ordinator for the NDT Sub-Project acted as a Short-term NDT expert in Bangkok, Thailand for a period of two months. During this assignment, the expert completed the following two books which will later be used as text books in the region:

- Lecture notes for NDT Appreciation Course for Managers.
- Lecture notes for Ultrasonic Testing of Materials at Level 2.

### **1.2. Tracer Technology and Nucleonic Control Systems**

National Tracer Group which looks after the radiotracing, radiogauging and other radioisotope applications on national basis made consistent efforts to popularise nuclear techniques in industrial sector through national mass media and undertook industrial surveys to explore



the possibilities of radiotracer applications. Neutron activation techniques and radioactive tracer techniques are now extensively applied for environmental and marine pollution studies on a larger scale. PAEC in co-operation with IAEA hosted National Seminar on Applications of Nuclear Techniques to the Metals and Manufacturing Industry at INMOL, Lahore from 26-31 March, 1994.

### **1.3 Radiation Technology**

Potential for radiation processing of flue gas treatment has been investigated at the national level. National Co-ordinator for Radiation Technology for Pakistan attended the Co-ordinators Meeting of this project held at Ho Chi Min City, Viet Nam from 20-25 March, 1994.

### **1.4 Nuclear Analytical Techniques**

#### **- Environmental Studies**

In collaboration with the National Institute of Oceanography, we undertook the evaluation of samples obtained by the Second Pakistan Antarctica Expedition. To achieve data of environmental significance, coastal and marine sediments obtained from different sites and depths were analyzed using neutron activation analysis and WD-XRF. About 40 elements including major, minor and trace elements were studied.

#### **- Geological Studies**

The characterization of a large number of alkaline igneous complexes of Northern Pakistan for mineralogy and trace elements, especially of the rare earth elements is being performed in a joint study with Centre for Nuclear Studies. Such studies will provide information regarding the genesis of rock formation and their economic worth.

- **Health Related Studies**

Nuclear Analytical techniques were used in the study of human hair, nails, blood and other body fluids from certain referred patients to assess the possible role of trace and toxic elements.

- **IAEA Research Project**

In December 1994 an IAEA Research Contract on "Monitoring of Pollutants in Environmental Media utilizing NATs" was awarded by IAEA to PINSTECH. This will enable us to perform much needed environmental monitoring in industrial areas of Pakistan.

National Co-ordinator from Pakistan attended the National Co-ordinators Meeting of UNDP/RCA/Sub-Project on Nuclear and Analytical Techniques held at Sydney, Australia from 20-24 February, 1995.

**1.5. New Project Proposal**

**Marine Pollution Studies**

The new project proposal entitled: IAEA Regional Asian Project on Marine Containment and Transport Phenomena as submitted by Dr. Terry Hamilton (IAEA-MEL/Monaco) to IAEA, Vienna contains a very useful programme from marine pollution view point in the South East Asian region. The aims and objectives of this proposal are quite in line with the existing and long term programme of PAEC regarding coastal/marine water pollution studies along the coastline of Pakistan. We are pleased to express our interest in this new project proposal.

## **2. Medical Projects**

### **2.1 Radioaerosol Inhalation Imaging for the Diagnosis of Respiratory Diseases in the Developing Countries.**

Pakistan is participating in the RCA Project and continued studies on Tc-99m DTPA Radioaerosol Inhalation Scintigraphy for the measurement of permeability of alveolar membrane in healthy population and compare the results with the state of environmental pollution in the area. This study was continued at Institute of Nuclear Medicine & Oncology (INMOL), Lahore and 23 normal subjects were studied for alveolar membrane permeability. The results have been compiled. The Agency has now decided to extend the permeability studies to more than one cities of the participating countries and provide another nebulizer to each country for this purpose. As soon as another nebulizer is received, the work will be extended to other cities of Pakistan.

### **2.2. Immunoscintigraphy Recurrent Colorectal Cancer using Tc-99m Labelled Anti CEA Monoclonal Antibody.**

Immunoscintigraphy of the patients with recurrent colorectal cancer was performed with the antibody received from Germany on 14 patients. The results of all the cases were positive for recurrent colorectal cancer because the study was performed in recurrent cases only and not in primary tumours. After the second meeting of the co-ordinated group, more antibody was received from IAEA to perform these studies in recurrent colorectal tumours and not in primary tumours. This study was done in nine more cases. No problem has been faced in labelling the antibody with Tc-99m or in performing immunoscintigraphy.

### **2.3. Hepatitis B Screening**

Kits for hepatitis B markers were received from China and distributed to the participating centres in the country. These were used to study the methodology, performance and properties and their applications for different clinical groups (blood donors, pregnant women and liver cancer patients). Currently studies have been started at INMOL, Lahore for production of reagents and their use. In this respect glass beads coating techniques for antigen/antibody has been completed. Next step will be to use these locally coated Ag/Ab and to radiolabel Ag/Ab provided by IAEA. The Agency may arrange to supply the required unlabelled Ag/Ab. These studies are being continued under the regional project and related research contract on Hepatitis B Virus. The National Co-ordinator of the Project participated in the National Co-ordinators meeting held at Sydney, Australia from 24-28 October, 1994.

A request has been submitted to the Agency to provide expert services for 3 weeks during 1995 in the field of hepatitis B marker reagents production for related clinical studies. PAEC welcomes to host next National Co-ordinators Meeting of Project RAS/6/018 Diagnosis of Hepatitis B by Radioimmunoassay at INMOL, Lahore during 1995.

### **2.4 Care and Maintenance of Nuclear Medicine Instruments**

Quality control is now accepted as an integral part of routine procedures in the overall programme of nuclear medicine departments in Pakistan. Some seminars have been conducted at INMOL, Lahore to familiarize technologists with relevant quality control practices. Situation regarding preventive repair and maintenance has already improved. Three laboratories for repair and maintenance of nuclear medicine equipment have been established by PAEC.

**2.5    Computerized Dosimetry in Brachytherapy and Radiotherapy of Carcinoma Cervix.**

This project was awarded to Nuclear Medicine, Oncology and Radiotherapy Institute (NORI), Islamabad by IAEA. So far 185 patients have been planned. A paper was presented by the Chief Investigator of the Project titled "Introduction of computerized planning and dosimetry in intracavitary treatment of carcinoma of cervix at Seoul, Republic of Korea in March, 1994.

**2.6.   Computer Assisted Planning and Dosimetry in Radiotherapy of Head and Neck Cancer.**

NORI, Islamabad was also awarded a research contract under the above RCA Project. Under this project, 417 patients of cancer of head and neck were planned in the said period. The patients were provided treatment with radiotherapy, surgery and chemotherapy, after the treatment strategy being decided in Joint Cancer Clinic, comprising of ENT specialists, oncologists and radiotherapists. The planning of the patients was done on the dedicated computer to provide accurate and uniform dose distribution to the target organ.

**2.7    Quantitative Evaluation of Nuclear Medical Procedures for Diagnosis of Liver Disease.**

Routine quality control tests of ultrasound equipment and gamma camera are being carried out regularly and patients suffering from variety of focal as well as diffuse liver diseases are scanned ultrasonically as well as scintigraphically.

## **2.8    Radiation Sterilization of Tissue Grafts**

During the period of January, 1994 to January, 1995 about 100 batches of placentae were collected, processed, freezdried and radiation sterilized by gamma radiation of 2.5 Mrad which are utilized at Liaquat Medical College Hospital, Jamshoro and in Karachi Civil Hospital for the burns patients. The results are quite satisfactory. 10 heads of femoral bones are collected from the Liaquat Medical College Hospital, Jamshoro during the total hip replacement and partial hip replacement operations. These heads of femoral bones are pausteurised and stored in a deep

freezer after proper cleaning procedure. Band saw has been received from Agency in January, 1995. The bone bank is going to function regularly in the near future.

## **2.9.   Strengthening Nuclear Medicine in RCA Countries**

A Meeting of the Regional Advisory Board of the project was held at Chiang Mai, Thailand from 27-29 July, 1994. The Member of the Board from Pakistan attended the Meeting. As a follow up of the meeting the PAEC has approved a one year course for nuclear medicine technologists to be held at the medical centres of PAEC at Karachi and Lahore. The first course has been planned to start from 1st January, 1996.

## **3.    Agricultural Projects**

Pakistan is conducting pilot scale studies on preservation of various food materials by gamma irradiation. We are in the process of formulating regulations for commercial food irradiation in Pakistan. A commercial plant is already in operation in Lahore providing services to industry in radiation sterilization of medical products.

**3.1 Food Irradiation Process Control and Acceptance (RPFI-III)**

Under the project on food irradiation and processing experiments were conducted on enhancing shelf-life of potatoes and onions, and decontamination of spices and poultry meat.

**3.2 Utilization of Radiation - Induced Mutations and Somatic Cell Genetics for Development of New High-Tech Varieties of Food and Fibre Crops**

Radiation Induced Mutations have played a vital role in developing new varieties of crop and plants. Atomic Energy Agricultural Research Centre, Tandojam is one of the centres of excellence of contemporary mutation breeding in the World. The proposed project envisages to combine radiation and chemical mutagenesis in conjunction with somatic cell genetics for solving the plant breeding problems of 21st century. This technology is being successfully used at this Centre with highly significant economic impact on our predominantly agricultural country.

**3.3 Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen.**

Pakistan is taking active interest in the RCA Project on Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen. The project has stimulated collaboration among participating countries and provided the technical knowledge in the use of N-15 isotope methodology required for quantifying BNF by grain legumes.

#### **4. Research Reactor Based Projects**

##### **Research Reactor Utilization**

We feel that this project should be more oriented to productive utilization to make economic benefits. The utilization of 10 MW Swimming Pool Reactor at PINSTECH, Islamabad is being done for radioisotope production and physics experiments.

#### **5. Energy Based Projects**

##### **Energy and Nuclear Power Planning**

- Under the RCA Project on Energy and Nuclear Power Planning, Phase II, a Meeting of National Experts from selected RCA countries was organized in Jakarta, Indonesia from 12-16 December, 1994 to discuss data requirements of IAEA's Planning Model for Energy, Electricity and Nuclear Power Planning with emphasis on WASP Model. A senior PAEC scientist participated in this meeting. Other experts were drawn from Bangladesh, Indonesia, Republic of Korea, Malaysia, Philippines and Viet Nam. This meeting was organized with the following objectives:
  - (a) To report and review the problems with input information and processing and define the areas requiring attention.
  - (b) To assemble representative data to illustrate specific case study needs.
  - (c) To select 4-6 RCA Member States for which specific case studies would be undertaken.
  - (d) To provide recommendations as to the scope and duration of the country case studies.



The meeting proved to be very fruitful as all the objectives of the meeting were fully met. The main problem areas with respect to input data of WASP model were identified and recommendations for future actions and activities to be undertaken under this project were prepared. PAEC fully endorses that the future activities envisaged for this project will considerably enhance the capabilities for Energy, Electricity and Nuclear Power Planning in RCA countries.

An Expert Advisory Group Meeting on Strategies for Nuclear Power Programmes in RCA countries was held in Bangkok, Thailand from 7-11 November, 1994 in which Pakistan was also represented to identify the key issues and to consider strategies for implementation of nuclear power programmes in RCA countries. This meeting was a part of the continuing programme of the RCA Project on Energy and Nuclear Power Planning with specific objective to facilitate national implementation of nuclear power programme through the pooling and analysis of information on effective strategies used in RCA Member States. The main output of this project would comprise analysis of recent strategies and recommendations for successful implementation of nuclear power projects in RCA Member States. After deliberations, the members of the Expert Advisory Group have drawn up the format, guidelines and recommended the table of contents for preparation of national report on experience and issues related to planning and implementation of nuclear power programmes in RCA countries. Besides, other activities were also recommended by the experts to be continued through this project in the regional context.

## **6. Radiation Protection Project**

This project is being carried out with the collaboration of IAEA to strengthen radiation protection infrastructure in the country. A PAEC scientist participated in the Project Formulation Meeting for the Reference Asian Man Phase-II Ingestion

and Body Content of Trace Elements of Importance in Radiological Protection held at Nakimanto, Japan from 27 February to 3 March, 1995. The National counterpart attended the National Co-ordinators Meeting for Mid-Term Review of RCA Project on Radiation Protection Infrastructure held in Kuala Lumpur, Malaysia from 20-24 March, 1995. We stress that the emphasis of the project Radiation Protection Infrastructure be further placed on the operational safety of irradiation facilities.

7. Other Comments

Pakistan is providing training to the scientists from the region at its Nuclear Institute for Agriculture & Biology (NIAB), Faisalabad in agriculture and biology and also in nuclear medicine at our nuclear medical Centres/Institutes and would like to continue this co-operation so that other countries in the region could also avail this offer through TCDC. Pakistan is also keen to send its experts to the Member States for short duration as and when required.

Keeping in view the importance of Civil Engineering in the area of public welfare including soil investigation, materials testing, water resources management and sewerage engineering, Pakistan would like to propose that this area be given due importance under RCA programme.

In conclusion, Pakistan wishes to express its satisfaction on the implementation of various RCA activities so far. Pakistan fully supports RCA activities and has great desire to further promote regional co-operation in peaceful uses of nuclear energy.

In the end I would like to thank the Government of Malaysia for hosting 17th RCA Working Group Meeting and we look forward to continue co-operation under RCA.

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## **COUNTRY STATEMENT OF THE PHILIPPINES**

### **17th RCA Working Group Meeting Kuala Lumpur, Malaysia, 27-30 March 1995**

Mr. Chairman,

Allow me first to congratulate you on your election as Chairman of the 17th RCA Working Group Meeting. I am positive that you would steer this meeting into its successful completion.

The Asia and Pacific region is considered the most dynamic region in a world that is very fast changing. The world order toward freer trade has far reaching implications and if we in the region are to survive and to grow in the intensely competitive global marketplace, we have to draw from each others strength and fortify each others weakness.

The need to continually scale the know-how ladder cannot be overemphasized. Our production sectors - agriculture, industry and services - must continually be able to handle higher and emerging technologies to remain viable. And even while we work towards this, we must at the same time work towards satisfying the individual's basic needs in the social environment that he moves in. The pursuit of all these, however, must be undertaken taking into consideration environmental sustainability. The RCA program reflects the recognition of these needs although it may be observed that the agriculture sector needs to be given more emphasis. The challenge for us is to fine tune our program further. There is no doubt that the RCA has the capability and sensitivity to respond to the challenge.

#### **Extrabudgetary Contribution**

It is with pleasure that we inform that this year, the Philippines expects to contribute about \$10,000. We shall appreciate it very much if this could be channeled towards the conduct of a training course on biological dosimetry, including chromosome aberration. We shall be pleased to host this training course.

#### **Industrial and Environmental Applications**

We recognize that the intensely competitive global marketplace demands that industry continually update itself and adopt higher and emerging technologies that will allow competitiveness. There is urgent need for industry to be familiar with, to see in their real setting, the technologies it must chose from to improve its efficiency and productivity to ensure that it does not lose out when it is ready and able to make a choice.

Developing nations, however, can seldom afford to do developmental work much less embark on demonstration scale on such technologies. The UNDP industrial project has the unique role of facilitating technology transfer. For this reason, we regret the budget cuts in the project. While it is true that these budget cuts do not impinge on the integrity of the project, it does affect its effectiveness. In this connection, we have recommended to our country

representative to the UNDP Regional Development Cooperation Meeting, which is also being held at this time here at Kuala Lumpur, to strongly support the restoration of the budget cuts.

We fully subscribe to the initiatives identified in response to the additional tasks recommended by the Tripartite Review Meeting covering promotion/public awareness and technician training deserves support.

We hope that the Midterm Review Mission conducted this year will result in enhancing further UNDP's support to the Project.

## 1. Radiation technology

The Philippines participated in the national coordinators meeting and the following training courses on (1) the fundamental aspects of radiation technology and environmental applications (2) radiation sterilization-validation, routine control and application of ISO standards and (3) advanced applications of radiation technology - biomedical applications; the seminar on electron beam technology for purification of flue gases; and the workshop on radiation technology for biomedical applications.

### 1.1 Radiation Sterilization

There is keen interest by a private company to set up a commercial radiation sterilization facility. The PNRI will provide technical support to the facility. A request for expert to assist this company was submitted to IAEA.

Industries continue to avail themselves of the gamma irradiation services of the PNRI for the radiation sterilization of empty aluminum tubes, sutures and gloves and for decontamination by radiation of empty gelatin capsules, spices and raw ingredients for cosmetics.

Research and development activities on radiation sterilization of medical products, pharmaceuticals, tissue and bone grafts are on-going. Studies on the radiation sterilization of rubber gloves and orthopedic implants and decontamination of some veterinary drugs and raw ingredients for cosmetics have been done. Clearances from the Bureau of Food and Drugs have been obtained for some of these products.

A national training course on radiation sterilization will be organized in September 1995. Project support in terms of expert services has been requested.

### 1.2 Radiation Curing

Our Forest Products Research and Development Institute (FPRDI) received a one-week expert mission, from 12-16 September 1994, on UV curing of surface coating under this project. During this mission, a one-day seminar/workshop was organized. Twenty-six participants attended.

### 1.3 Radiation Vulcanization of Natural Rubber Latex

PNRI is continuing its R & D on radiation vulcanization of natural rubber latex. One drum (200 liter) irradiation studies will be planned for October 1995. For this purpose, expert services will be necessary.

### 1.4 Electron Beam Treatment of Flue Gases

During a one-week expert mission, 30 May-3 June 1994, a one-day seminar on electron beam treatment of flue gases was organized by PNRI in cooperation with the National Power Corporation. The seminar which was attended by twenty-six participants from 14 organizations generated much interest.

## 2. Nuclear analytical techniques

The Philippines participated in the two intercomparison exercises that were initiated under this project (1) for total mercury and methyl mercury in human hair, and (2) for multi-element studies of three bulk materials which are similar in composition and particle size distribution to airborne dust.

The IAEA Analytical Quality Control Service (ACQS) Intercomparison on air pollution-related materials brought about contact among laboratories interested in environmental analysis. Five local laboratories participated in the intercomparison. Through this exercise a common desire to harmonize techniques was perceived. The importance of generating accurate environmental data is very important especially for Metro Manila where severe environmental problems require the formulation of drastic pollution control policies.

The Sub-project National Coordinator participated in the combined NCM and expert workshop on application of ISO-25 and other relevant international standards held at ANSTO, Sydney, Australia last 20-24 February 1995. We hope to adopt ISO-25 for our analytical laboratories.

We reiterate our strong interest to avail of a regional "suitcase" fellowship to enable the development of analytical procedures and analysis of samples in connection with our air pollution studies.

## 3. Non Destructive Evaluation

For the year 1994, twelve national NDT training courses were conducted : UT Level 1 (2); UT Level 2 (3); RT Level 1 (2); RT Level 2 (3); ET Level 2 (1); and SM Level 2 (1). A total of 150 participated in the courses.

A total of 49 (18 UT Level 2; 28 RT Level 2; 2 SM Level 2; and practitioners were certified.

A national seminar on industrial applications of NDT for managers and supervisors and another on NDT equipment and regulations were conducted. We look forward to the conduct of a national seminar on NDT applications in the aircraft industry in June 1995. Assistance from the project in the form of expert services has been requested.

The Philippines participated in the training course on industrial application of NDT evaluation held in Korea and the national co-ordinators meeting.

#### 4. Tracer technology

The Philippines participated in the workshop on use of tracer technology to study dispersion of effluents in surface waters and the training course on application of isotope technique in process optimization held in Malaysia.

Strengthening of the national tracer group (NTG) as well as engineers from the industry sector and government institutions (other than PNRI) continues to be a major focus. Industry and government companies have been able to do tracer and sealed sources applications on their own or with the help of the NTG, their mother companies or other foreign service firms.

#### 5. Nucleonic control systems

Over a ten-year period, the number of nucleonic gauges in Philippine industry has more than doubled, from 193 units in 1984 to 425 units in 1994. Increases are most notable in the food, construction and energy sectors and these industries are among the top corporations in the country.

We participated in the executive management seminar on application of nucleonic control system to coal processing operations held in Thailand.

### Medical and Biological Applications of Nuclear Techniques

#### 1. Radioimmunoassay for Hepatitis B Diagnosis

The Philippines continued to participate in the training opportunities provided under the project.

Using the protocols introduced at the regional training course in Beijing in 1993, RIA kits from bulk reagents supplied by IAEA were prepared. These were used in assays done on professional blood donors, pregnant women, and health care staff.

Following the return of the national coordinator from the national coordinators meeting, an additional assay group was set up, specifically, patients with liver carcinoma/cirrhosis.

Development of local QC sera, solid phase RIA and tracers will be undertaken.

## 2. Radiation Sterilization of Biological Tissue Grafts

The Philippines continued to take active part in the in project through attendance in the training course on open learning techniques held in at Suzhou, China and the national coordinators meeting.

We are looking forward to the scheduled country development review in July 1995; our participation in the country working mission at the Berlin Tissue Bank, Germany in May 1995 as well as the conduct of an executive management seminar for decision-makers in late November 1995.

## 3. Use of Computers in Technetium 99m Imaging

The Philippines participated in the highly successful training course held in Australia last 31 October - 18 November 1994 on the use of computers in nuclear medicine.

## 4. Coordinated Research Program

### Improvement of cancer therapy

The Philippines participated in the final coordination meeting of the CRP on computer-assisted planning and dosimetry in radiotherapy of carcinoma of the cervix. The results of the program adequately demonstrated the usefulness of personal computer-based system in the treatment planning, accuracy and improvement of survival/cure rates of cancer patients. Thus, we believe it would be judicious to organize a new CRP to build on the experience derived from this project.

The standardization of I-131 treatment for hyperthyroidism with an intent to optimize radiation dose and treatment response

The Philippines is participating in this newly initiated coordinated research program. Protocol implementation has been initiated. We shall be pleased to host the first coordination meeting scheduled in November 1995.

## 5. Projects with TC and CRP components

### 1. Nuclear instruments maintenance

We participated in the workshops on the upgrading of analogue gamma camera with IBM PCs and relevant software held in Malaysia and on the quality assurance in nuclear medicine imaging-hardware and software aspects held in Thailand.

We were pleased to host the workshop on protection of nuclear instruments held 27 February to 17 March 1995. The participants found the workshop very useful. Many participants saw the various electrical disturbances and electromagnetic interferences and their analysis for the first time. In view of the profound importance of nuclear instruments in the development and

promotion of nuclear technology applications and in view of the scarce resources available to purchase such equipment, it is believed that more workshops of this nature should be organized.

## 6. New projects

We support the project proposals on the :

- determination of glomerular filtration rate by nuclear medicine techniques: validation of the plasma clearance and external counting methods and its application in the management of diabetic nephropathy
- optimization of fractionations of high dose rate (HDR) brachytherapy in combination with teletherapy in the curative and palliative treatment of common malignant diseases using a PC-based planning and dosimetry system

## Agriculture Projects

### 1. TC with CRP components

#### 1.1 Improvement of grain-legume Rhizobium Symbiosis to fix atmospheric nitrogen

The Philippines participates in this project through a research contract. During the period under review, quantification of nitrogen fixation in five mung bean genotypes were undertaken in two plant sites, the PNRI in Diliman, Quezon City and the Institute of Plant Breeding in Los Banos, Laguna. This included a PNRI developed mutant. The PNRI mutant (PAEC3) compared favorably with the other genotypes. Corn and cotton were used as reference crops. The study showed that cotton was a better reference crop.

Following the nitrogen-fixed quantification studies, corn plantings were done at the experimental site to estimate residual N effect. A positive effect was observed on corn yield.

In view of the encouraging results, another CRP may be considered, possibly involving mutation breeding particularly in the development of acid-tolerant varieties, to build on the experience gained as a result of the study.

#### 1.2. Public acceptance and trade in irradiated foods

The Philippines participates in this project through a research agreement on consumer acceptance and market testing of irradiated onions, garlic and other spices. For 1995, test marketing studies will be done on onions and garlic. We look forward to hosting the first coordination meeting on 27-31 October 1995.

In 1994, limited test marketing of onions was done. Consumer acceptance was indicated by the purchase of all onions placed on sale.

## Research Reactor, Energy Based and General Projects



## 1. Research reactor utilization

One Philippine participant attended the training course on the utilization of research reactors held in Sydney, Australia and had the opportunity to attend the 9th Pacific Basin Nuclear Conference. We expect to participate in the project phase supporting development of Small Angle Neutron Spectrometers through two-week fellowships in countries having the facility.

## 2. Energy and nuclear power planning

The Philippines participated in the meeting of national experts on data requirements of IAEA's planning models for energy, electricity and nuclear power in Jakarta, Indonesia.

## 3. Nuclear Information System

We appreciate very much the inclusion of the Philippines among the countries eligible for the document delivery service. We are certain that this will be of great help to our users. We have already received the coupons for this purpose.

## Radiation Protection Projects

### 1. TC Projects

#### 1.1 Radiation protection infrastructure

Within the framework of the RCA Project RAS/9/006 and in accordance with the priority areas established in the Expert Advisory Group Meeting in Australia in February 1994, the following activities were undertaken:

##### 1.1.1 Off-Site Emergency

Three Philippine participants attended the regional workshop in off-site planning and countermeasures for radiological emergencies held in Mount Macedon and Sydney, Australia.

The reconstituted PNRI Task Force on Radiological Emergency Planning and Preparedness are in the process of reviewing the adequacy of radiological emergency plans developed for PNRI nuclear facilities and the proposed revisions of criteria, plans and guidelines and other documents on radiological preparedness.

The PNRI is participating in the RCA intercomparison programme on measurement of radioactivity in environmental samples and that being run by the IAEA and the WHO International Reference Center.

##### 1.1.2 Dosimetry (External and Internal)

We participated in the workshop on external dose assessment techniques. The new ICRU operational quantities are being implemented in our routine monitoring and reporting of personnel exposure to radiation and in the calibration protocol.

We also participated in the training course on calibration and maintenance of radiation protection instruments held in Tokai-Mura, Japan where Phase II of the intercomparison run for personnel dosimetry was discussed. As a result of Phase I, PNRI submitted a TC proposal which was subsequently approved by the IAEA to establish a TLD system for personnel monitoring services for implementation in 1995.

The National SSDL Organization has formulated a comprehensive work programme to ensure accuracy and reliability of dose measurements in therapy applications, among others. This included an intercomparison programme of secondary standard dosimeters, setting up of calibration protocols, institutionalizing a QA/QC programme of dosimetry equipment and conducting appropriate training courses/workshops for qualified personnel.

The PNRI operates a cytogenetic laboratory which provides biological dosimetry services in cases of accidental exposures to radiation and also undertakes, among others, genetic counseling services. A routine bioassay monitoring service to radiation workers involved in the use of unsealed sources is being established.

#### 1.1.3. Reference Asian Man

The Philippines participated in a CRP on Reference Asian Man which held its final coordination meeting last year. It also participated in the formulation meeting for Phase 2 of the CRP held in Japan last year. We wish to reiterate strongly our recommendation and support for the establishment a central reference laboratory, possibly the National Institute of Radiological Sciences in Japan, where exchange of samples, external quality control and validation of methods will be provided.

#### 1.1.4. Regulations

The Philippines participated in the workshop in Kuala Lumpur, on the implementation of ICRP 60. A study group is reviewing and assessing available data specific to license operation and PNRI facilities to advise on the practical implications and adoption of ICRP 60. Two seminars in Metro Manila and one in Cebu City regarding ICRP 60. The Philippine Association for Radiation Protection (PARP) created an AdHoc Committee to harmonize guidelines for the implementation of ICRP 60.

The Philippine Organization of Medical Physicists (POMP) conducted a workshop on nuclear regulations and completed the final draft of a Code of Practice on the calibration of Co-60 Therapy Facilities.

A Country Radiation Protection and Waste Management Infrastructure Profile was drawn by a task force constituted for the purpose. The Task Force report outlined the present status of activities in these areas and highlighted proposed enhancement measures to adequately address the legislative, administrative and technical requirements needed for the safe use and control of radiation sources in the country. Relevant IAEA guidance materials/documents were used in the effort.

### 1.1.5. Training

The Philippines participated in the workshop in Sydney, Australia to develop training materials in radiation protection. With the active participation of the Philippine Society of Nuclear Medicine, the PNRI developed distance learning materials for nuclear medical technologist.

Pilot testing and assessment of a training program designed for nuclear medicine technologists was completed. Thirty participants from six medical institutions attended. The course syllabi developed for this purpose was presented as part of a country report at the Chiang Mai meeting of the full advisory board within the framework of the Nuclear Medicine sub-project.

A national train the trainers course in radiation protection specific to industrial radiography is being planned in coordination with the Philippine Society for Non-Destructive Testing.

## 2. New Project Proposals

### 2.1 Storage and Planning for Disposal of Radioactive Wastes

We share the view that very limited activities on waste management have been implemented under the RCA programme. A number of operational TC projects in some of the RCA member states seem to reflect a national effort to address varying specific concerns on storage and disposal of low to intermediate level wastes. Moreover a number of RCA countries are concerned mainly with radioactive wastes generated from small nuclear applications including the safe management of spent sources.

The Philippines recently hosted the Regional TC on Management of Spent Radiation Sources and Other Wastes from Small Nuclear Applications. The country report presentations on the status of waste management indicated that safe management of spent radiation sources is a major concern. Considering further recent reports on radiological accident involving spent radiation sources, this only serves to highlight the need to address these concerns for radiological protection point of view.

We express full support to this proposal and expect to actively participate in the activities which will be agreed upon. A formulation meeting should be convened to provide the necessary focus, establish priority areas and integrate future work programmes consistent with available resources and the type and volume of radioactive wastes being generated in the region.

### 2.2 Marine Contamination and Transport Phenomena

The project is expected to contribute to radionuclide monitoring and assessment and to manpower development. It aims, among others, to identify, quantify, and map regional levels of key anthropogenic isotopes (Cs, Pu isotopes, and  $^{90}\text{Sr}$ ) and naturally occurring radionuclides ( $^{210}\text{Po}$ ,  $^{210}\text{Pb}$ , and Ra isotopes) and in the process train scientists in the region on the sampling

methodologies and measurement techniques for key anthropogenic radionuclides and associated contaminants.

We support and expect to participate in the proposed project as it will contribute new and important information which are useful to radiological safety, public acceptance of nuclear power and modelling. The Philippines has the institutional capability to join such undertaking in view of its recent participation with the recently concluded CRP entitled "Sources of Radioactivity in the Marine Environment and their Relative Contribution to Overall Dose Assessment from Marine Radioactivity".

**Country Statement of Singapore**

**17th RCA Working Group Meeting  
Kuala Lumpur, Malaysia, 27 to 31 March 1995**

Mr Chairman, distinguished delegates and IAEA Officials.

Mr Chairman, please accept my delegation's heartfelt appreciation for the warm welcome and hospitality of the Government of Malaysia and of MINT.

Singapore has been a member of IAEA RCA since the early days of its inception. We are encouraged by its sustained vigour and successes in bringing about cooperation among members in research and development as well as in personnel development. We note that it is meeting its primary goal of promoting the peaceful use of nuclear technology most convincingly and diligently.

Our participation has mainly been in the areas of Nuclear Medicine and Biology, Non-Destructive Evaluation, Nuclear Analytical Techniques and Radiation Protection and Testing as well as other Radiation Technology. The scale of our involvement, compared to our esteemed colleagues in the RCA, is limited due to our limited areas of utilisation.

In Nuclear Medicine, our work has been in the Radiation Sterilization of Tissue Grafts, the Radioiodine Treatment of Hyperthyroidism as well as the Radioimmunoassay of Hepatitis B. We are heartened that in the Distance Education Project IAEA has been supportive towards the issue of certification for trainees of the programme. In Analytical Techniques, we are just now party to the Research Contract Project on "Applied Research on Air Pollution Using Nuclear-Related Analytical Techniques". We thank RCA for initiating this project and appreciate the opportunity to be part of the collaboration.

In the area of NDT, we have benefited from the range of training programmes and expert advice, particularly in proficiency testing. RCA will also be instrumental in deriving a regional standard acceptance in NDT for all member countries.

Chairman, on behalf of our National Coordinators, please be assured of our highest regard and efforts.



**SEVENTEENTH RCA WORKING GROUP MEETING,**  
**KUALA LUMPUR, MALAYSIA, 27-30 MARCH 1995.**

**COUNTRY STATEMENT - SRI LANKA**

Mr. Chairman, distinguished delegates and other participants,

Please accept my congratulations Mr. Chairman, on your selection to the Chairmanship of this 17th RCA Working Group Meeting. I also wish to express the appreciation of the Government of Sri Lanka to the Government of Malaysia for hosting this meeting.

Sri Lanka which has been a party to RCA since 1972, notes with satisfaction the success which regional co-operation has achieved in meeting the goals of the RCA to promote and co-ordinate co-operative research, development, and training projects in nuclear science and technology through sharing of regional resources, including facilities, equipment and expertise and the pooling of knowledge and close communication between scientists. Sri Lanka has benefitted from RCA activities in a number of areas by way of awareness, development of skilled manpower, and application of knowledge to solution of national problems. I wish to express our gratitude to the IAEA, UNDP, donor countries, national institutes, RCA coordinators and all others who have contributed to the success of the RCA.

**INDUSTRIAL APPLICATIONS**

Sri Lanka has considerably benefitted from the UNDP/RCA/IAEA project on the Use of Radioisotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development. Sri Lanka wishes to register its concern on the reduction of the UNDP contribution to this project. This has been already conveyed to the UNDP.

As a result of this project and the previous UNDP project on Industrial Applications the capability of conducting national training courses upto Level 2 has been developed and Level 3 capabilities are being developed. A national standard (SLS 996) has been

adopted for training and certification of NDT Personnel. The NDT Society of Sri Lanka has entered into a collaborative agreement with NDT Society of Bangladesh. As a result of these activities the NDT capabilities in Sri Lanka has significantly improved, on quality and quantity. Assistance is required for Level 3 Certification in Ultrasonic Testing and Surface Methods. The NDT National Coordinator has requested an opportunity to obtain Level 3 Certification for himself soon after the National Coordinators' meeting scheduled to be held in Australia, since although he has the competence he does not have the certification. Once he obtains Level 3 Certification it would be possible to train and certify Level 3 NDT personnel in Ultrasonic Testing and Surface Methods without further assistance.

A National Executive Management Seminar of RVNRL was held in May 1994 with the assistance of two IAEA experts. A proposal has been made for construction of a pilot plant for irradiation of rubber latex to demonstrate the technology to the rubber industry. The national training course on Radiation Chemistry is planned for October 1995.

A demonstration on gamma scanning of the distillation column at Ceylon Petroleum Refinery was carried out in 1994 with the assistance of an expert. As a result of this exercise the technical staff of the Ceylon Petroleum Corporation has acquired the capability of gamma scanning distillation columns without further assistance. A feasibility study on the use of nuclear tracers to detect seepage from a garbage disposal site to a river, which is a source of drinking water has been conducted and this exercise will be conducted the near future. A national tracer group has been formed and several industrial problems that can be solved using tracers have been identified.

Two participants from Sri Lanka attended the Workshop on Environmental and Technical Applications of Nuclear Analytical Techniques held in India. A national Committee on NAT has been formed and the Committee Members participated in the intercomparison exercises on total mercury and methyl mercury in human hair and minor and trace elements in air-borne dust samples. Sri Lanka will be participating in the CRP on Air Pollution. Assistance of an expert is requested to hold a national workshop on NAT.



## MEDICAL APPLICATIONS

Medical applications have been among the more successful nuclear activities in Sri Lanka. IAEA Technical assistance has been provided to several medical centres including Government Cancer Institute, National Blood Bank, Colombo General Hospital, and the Medical Facilities of Peradeniya and Ruhuna Universities to upgrade and modernize the existing nuclear medicine facilities and to establish new ones. These include the development of RIA facilities for in-vitro diagnosis, the establishment of computer supported Gamma camera equipment for in-vivo diagnostic imaging and the improvement of radiation therapy for cancer patients by the introduction of a high dose rate Co-60 Brachytherapy system.

Good progress has been made on the establishment of a Tissue Bank under an IAEA Model Project. The construction of the Tissue Bank building is almost complete and the irradiator has been installed. The operational activities will commence after the technical staff undergoing training returns.

Sri Lanka is using RIA for screening of donor blood for hepatitis B and is a participant of the RCA project on Diagnosis of Hepatitis B by RIA. Under this project 2000 blood samples from health workers, 2000 from pregnant women, 2050 from general population and 195 from patients with liver diseases were tested. This activity will be continued in 1995.

Sri Lanka has benefitted from the projects on Care and Maintenance of Nuclear Medical Equipment and Radiation Sterilization of Tissue Grafts.

Sri Lanka participated in the CRP on Computer-assisted Planning and Dosimetry in Radiotherapy of Carcinoma of Cervix and intends to participate in the new project on Optimization of Fractionations of HDR Brachytherapy in Combination with Teletherapy.

## FOOD AND AGRICULTURE

Sri Lanka participated in the CRP on Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen and the CRP on Food Irradiation Process Control and Acceptance.

## RADIATION PROTECTION

Sri Lanka places high priority on development of infrastructure for radiation protection activities as this is an essential pre-requisite for all nuclear related projects. Among activities undertaken in the recent past are, formation of a separate division for Radiation Protection, recruitment of additional staff and acquisition of equipment, updating of radiation protection regulations and regular training courses on Radiation Protection.

Sri Lanka participated in the RCA Training Course on Off-site Emergency Preparedness held in Australia and has commenced preparing a programme on emergency response.

## ENERGY BASED PROJECTS

The AEA has been conducting a 3 day national workshop on Nuclear Power and Energy Planning since 1992. This year we have extended this workshop to five days and obtained assistance of two experts provided under the RCA project. Three participants from overseas in addition to about 25 local participants, will attend the workshop.

A number of personnel from the Ceylon Electricity Board have been trained on WASP and it is being used by the CEB for Generation Planning. The CEB needs to train more personnel on MAED and WASP and could benefit from a Regional Training Course.

Finally Mr. Chairman, we wish to reiterate our appreciation of the Government of Malaysia for hosting this meeting, for the excellent arrangement and lavish hospitality.

**COUNTRY STATEMENT - THAILAND**  
**17th RCA WORKING GROUP MEETING**  
**27-30 MARCH 1995, KUALA LUMPUR, MALAYSIA**

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Mr. Chairman,  
Distinguished Delegates,

I would like to express my deepest gratitude to RCA, UNDP and IAEA for their strong and continued support enabling the expansion of peaceful uses of nuclear technology to all RCA member states throughout the past years. I would also like to extend my sincere appreciation to the government of Malaysia for their kindness in hosting the meeting with excellent arrangement and warmest hospitality. It is my great pleasure to participate in this important meeting and have an opportunity to meet with all other delegates of RCA member states.

Since the last meeting in Bali, Indonesia, The RCA activities in Thailand has gone through a series of progresses in the following endeavors.

**1. REGIONAL INDUSTRIAL  
AND ENVIRONMENTAL PROJECT**

**1.1 Tracer Technology**

Thailand has joint the UNDP/RCA/IAEA project RAS/92/073 Title: Tracer Technology and Nucleonic Control System through the Office of Atomic Energy for Peace (OAEP) since the beginning of the project in 1992.

In relevant to the Joint UNDP/RCA/IAEA project, the project entitled "The Application of Nuclear technology to Industry" (1992-1997) has been set up to obtain the financial support from the Thai Government. Accordingly, the annual financial inputs from the Government of Thailand in this project is about 30 thousands US \$. Accordingly, investment for equipments is about 30% of the annual budget.

The National Management Seminar and Demonstration on the Applications of Nuclear Technology to Industry was conducted at the Natural Gas Separation Plants, Rayong province during Agust 9-13 1993. It was organized by OAEP and the Petroleum Authority of Thailand with technical supports by UNDP and IAEA. In the event,

the first successful application of gamma-ray transmission technique for problem shootings in a distillation column of Thai Oil Company Limited was obtained.

UNDP/RCA/IAEA Expert mission to OAEP on the subject of Tracer-Process Optimization during October 18 - November 4, 1993. Experimental exercises, lecture, industrial visits and field application were conducted.

Recently, OAEP was inquired to provide the service to a new petrochemical plant in Rayong at the early plant start up stage during January 6-27, 1995. The next service had been performed at an oil refinery during February 20-24, 1995.

The rapid development in oil and gas industry including the expansion of production capacity and the establishment of new factories is the indication of the very strong potential for future application of tracer technology.

More studies are essential for the application of tracer technology for coastal engineering. Presently, there are totally 807 kilometer - three routes of natural gas pipeline network connecting gas reserves in the Gulf of Thailand. The increasing supplies from the fields has necessitated the expansion of the additional 4 routes of totally 885 kilometer. Two routes were completed in 1993 and the other two routes to be completed in 1995-1996.

The radioisotope investigation of the UNOCAL Off-Shore Gas Condensate Pipeline in the Gulf of Thailand will be performed by Tracerco Australasia in March-April 1995.

## **1.2 Nucleonic Control System (NCS)**

The UNDP/IAEA/RCA Regional Executive Management Seminar and Workshop on the Application of Nucleonic Control Systems to Coal Processing Operation was hosted by the Government of Thailand through OAEP and the Electricity Generation Authority of Thailand (EGAT). The courses were organized by IAEA and UNDP in Co-Operation with the Government of Australia, through the Australian Nuclear Science and Technology Organisation (ANSTO). Dr. John F. Easey was the Director of the courses and Dr. Peter Airey and Dr. Somporn Chongkum were respectively the Australian and Thai

co-directors. The courses were conducted at the Mae Moh Lignite Mine, Lampang during November 28- December 9, 1994. There were 14 participants from China, India, Philippines and Thailand in the seminar and 23 participants from China, India, Indonesia, Mongolia, Sri Lanka and Thailand in the workshop.

The courses were very successful and fulfilled the objectives. In addition, the participants also had the opportunity to visit Chiangmai and learn the northern Thai culture during the weekends.

### **1.3 Non-Destructive Testing (NDT)**

OAEP, with the cooperation of Thai Society for Non destructive Testing (TSNT) has serviced NDT technology transfer to private sectors via the national training course emphasizing on the specific and complicated work. In 1994 seven training courses in RT I, RT, II, and UT II, were organized. Ninety engineers and technicians from the government agencies, state enterprises and private sector personnel were certified.

Since 1 July, 1994 Mr. Shi Ji Hua, NDE expert from RCA has been worked at OAEP to assist in promotion of nuclear technology in this region by review the project activities, preparation of technical documents and to assist OAEP in conducting the NDT training courses.

### **1.4 Radiation Technology**

#### **1.4.1 Radiation Vulcanization of Natural Rubber Latex (RVNRL)**

National Workshop on RVNRL was organized at OAEP on 9-10 May 1994. Among the lecturers, there were two IAEA experts and three local lecturers. There were 39 participants, 22 from private sector and 17 from government organizations. The private sectors showed strong interest in RVNRL and want to participate with National Research Project on RVNRL. The private sectors also believed that RVNRL technology developed in Thailand can be possibly promoted to industrial scale.

A 2-years National Research Project on "Scale up RVNRL for Industrial Application Using Portable Gamma Irradiator" starting from 1994 has already been approved by National Center for Metal and Material Technology (MTEC), Ministry of Science, Technology and Environment. MTEC's grant is 2.7 million bahts (about one hundred thousand US \$) for purchasing 10 kCi portable batch type and dry

storage Co-60 source. The source will be installed at department of Nuclear Technology, Faculty of Engineering, Chulalongkorn University. The aim of this project is to

- assemble Co-60 source facility at Chulalongkorn University
- compare operation cost of RVNRL production between portable batch type source and both from the source at Thai Irradiation Center and at Kendall Gammatron Company.
- produce commercial production of RVNRL for rubber gloves.

#### **1.4.2 Industrial Radiation Sterilization**

The Regional Training Course on Radiation Sterilization- Validation Routine Control and Application of ISO Standard was organized at OAEP during 4-15 July 1994. There were 17 participants from RCA Member Countries and 7 local observers. The purpose of the course was to review and explain the present status of industrial sterilization of health care products with emphasis on radiation sterilization, the process validation and the current development of international standards, regulations and guidelines, to explain the main principles of : international standard (ISO) on industrial sterilization ; dose setting procedures in radiation sterilization; quality assurance systems and management. A further purpose is to promote the development of national standards and regulations (base on the ISO standard). The training course included lectures, classroom exercises and tutorials, laboratory work, field visit and individual assessments. Before the first lecture, initial test was carried out, to evaluate the level of participants about their fundamental knowledge on Radiation Sterilization. At the end of first week, second test was carried out which aimed to assess the progress of the course base on this information the modification of the course can be done. Final test was held at the end of the course in order to measure the degree of understanding of new information that had been achieved by the participant in all aspects.

#### **1.4.3 Upgrading of Sludge and Agricultural Waste by Radiation**

R&D in radiation treatment of sewage sludge has been carried out since 1989 when bilateral agreement has been made between JAERI and OAEP under the title of "Sludge Pasteurization and Upgrading by Radiation" starting from 1990 to 1993. and extended to 1998. Since huge amount of waste from agro-industries have caused pollution on rivers, lake and coast by discharge of wastes to environment. However, some of these wastes can be used for upgrading to useful products such

as animal feed, fertilizer and other substances. Radiation has characteristic to treat these wastes for the purpose of pasteurization or disinfection without change nutritional values or enzyme activity. By this reason, cooperative research programme on "Upgrading of Sludge and Agricultural Waste by Radiation" between JAERI and OAEP is being carried out. Major items of research are

- sludge pasteurization and upgrading by radiation
- upgrading of agricultural waste by radiation
- decolorization of slop

#### **1.4.4 Radiation Curing Technology**

At present the application of curing technology in Thailand is only confined to UV Curing in printing and packaging industry. The department of Photographic Science and Printing Technology, Faculty of Science, Chulalongkorn University is intensively conducting research and providing technology transfer in the area. To further enhance local interest on UV/EB curing applications, Thailand will organize "The Fifth International Rad Tech asia'95 Symposium and Workshop" on December 14-16, 1995 in Bangkok. It is advisable to have some linkage between RCA event and this Symposium/Workshop.

#### **1.4.5 Electron Beam Processing of Flue Gas**

According to A National Executive Management Seminar on Electron Beam Processing of Flue Gas in 1989, it was recommended that the potential user for radiation treatment of flue gas in Thailand should be the Electricity Generating Authority of Thailand (EGAT) because they were the major user of the fossil fuel. EGAT had already undertaken, with the assistance of Swedish Consultant, the Feasibility Study for the Electron Beam Purification of Flue Gases for the Mae Moh Power Plants (75-300 MW) which concluded that the technique was not feasible for Thailand for the time-being. There are also some difficulties associated with transportation of Ammonia in large quantities from Bangkok, fertilizer handling and marketing. Moreover, the SO<sub>2</sub> remove efficiency is expectedly insufficient while the investment costs much higher than the limestone/gypsum wet scrubber process. Nevertheless the NO<sub>x</sub> removal is not necessary for our plant since the applied heat for lignite is not high enough to produce NO<sub>x</sub>. At present, the Wet Scrubber Process has already been selected as practical alternative for the six 300 MW plants, three of which are under installation.

## **1.5 Nuclear Analytical Techniques**

Nuclear Analytical techniques sub-programme has been implemented into four components as follow :

The first component is to promote the use of nuclear analytical techniques for various applications, particularly in the field of environmental studies. For instance, neutron activation analysis has been using for the air pollution study. For the determination of manganese and selenium in human blood. For trace elements determination in cigarette and tobacco. Alpha and beta spectrometries are used for radionuclides determination in the marine environment.

The second component is the dissemination of the nuclear analytical techniques. This approach has been achieved through the training course, workshop and seminar activities held in various institutes.

The third component concerns the quality of the analysis work from different laboratories. Through IAEA's Analytical Quality Control Services Programme (AQCS), the quality of both nuclear and other analytical techniques has been checked by the participation of an intercomparison exercise with three materials (Vienna urban dust, coal fly ash and podsolic soil) relevant to air pollution studies. Also participated was an intercomparison run for two new candidate reference materials, IAEA-185 and IAEA-086, human hair.

The last component is focussed on the human resource development. Two scientists attended the Regional Workshop on "Environment and Industrial Applications of Nuclear Analytical Techniques", which was held at BARC, Bombay, India, from 24 January to 11 February 1994.



## **2. MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES**

### **2.1 Radiation Sterilization of Biological Tissue Grafts**

The tissue bank in Thailand was initiated in 1984, and will be celebrated the first decade with the Technical Meeting during 17-19 October 1995 at Siriraj Hospital, Thailand. The work done during ten years comprises of donor selection, tissue procurement, preservation, packaging, sterilization and quality control.

The source of tissue has been cadavers and living donors numbering 397. The total number of procured bone & tissues is 13,676. The bones & tissue allografts processed from this center has been used in 44 hospitals by 134 surgeons, free of charge as the center is run under the patronage of H.R.H. Princess Galyani Vadhana. There were 1178 operated patients, to which records for 1086 is available in which 581 are males and 486 females. In 51 cases (4.33%) there were major complications related to the grafts.

The methods of procurement and processing of tissue allografts in the Bangkok Biomaterial Center which are innovative, were proposed at the workshop of RCA (Regional Co-Ordination Agreement) meeting are as follows.

Tissue allografts were incubated at a temperature of 60 C or in warm water, for 2 hours after cleaning and rinsing before freeze drying to inactivate HIV. This proposal was presented in Korea during the 3-6 July, 1991, workshop. The term "bone pasteurization" was introduced for the first time. Many tissue banks have now started using this treatment of bone pasteurization. In the project formulation meeting in Philippines (6-8 August 1992), the Bangkok Biomaterial Center proposed the procedure of inactivating /hiv and HBsAg by using Sodium hypochloride solution (0.5 percent for 30 minutes) since the incidence of viral hepatitis-B is high in Thailand. All tissue Allografts especially freeze dried bone allografts are processed using this method now.

At the RCA project coordinator meeting in Vienna 3-7 Oct 1994. The Bangkok Biomaterial Center proposed the procedure of high temperature treatment of bone allografts at 1000 C. The residue of the process which has undergone a chemical change and resulted in a new compound will be used to produce an artificial eye ball so called as "the hydroxyapatite

ocular implant” In this project, the hydroxyapatite in different forms will be processed and used in the patient for clinical trials.

An IAEA expert visit was made by Professor Glynn Phillips to the center from 13th to 20th September, 1993. He reported that it was feasible to set up a master degree project in tissue banking at the Bangkok Biomaterial Centre, Siriraj Hospital, Mahidol University. The post-graduate School accepted the proposal and the project is in the final stages of formulation. The objectives of the course is to impart training, to carry on research and to upgrade into the regional training center of Biomaterial cells and Tissue transplantation.

## **2.2 Strengthening Nuclear Medicine in RCA**

There was the first expert meeting at the Faculty of Medicine, Chaingmai University in July 1994. The objectives was to assist the RCA countries in up-grading the human resources by offering the specific education or the training courses, and equipment assistance.

## **3. AGRICULTURAL PROJECTS**

### **3.1 Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen**

The research work entitled “Screening with Nuclear and other Techniques for Yield and N<sub>2</sub> Fixation in Mungbean” has been carried out in Thailand since 1989. The objective was to select mungbean lines and rhizobium strains for high nitrogen fixation, results obtained from screening of 423 mungbean lines indicated that some mungbean line eg. VC 1776, VC 3182, VC 1830, VC 1693 and VC 2335 were higher in nitrogen fixation than the recommended cultivars.

Under normal field condition the selected mungbean line could fix N up to 70%. It was also found that most mungbean rhizobia were effective and sorghum was the outmost suitable reference plant for measuring N<sub>2</sub> fixation in mungbean. As the 17th RCA Working Group will held in conjunction with the Terminal Tripartite Review Meeting for the UNDP funded project on “Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes”, Thailand would like to strongly participate for the extended program.

## **4. RESEARCH REACTOR UTILIZATION, ENERGY PLANNING AND NUCLEAR INFORMATION**

### **4.1 Research Reactor Utilization**

Since the Project Formulation Meeting (PFM) in Oct 1993 at Taejon, Republic of Korea, some workshop/training course were attended by OAEP staffs, and also in this year, i.e. Regional Training Course on Application of Nuclear Techniques in Material Science, in Sydney, Australia (20-31 Mar 1995) and Regional Workshop on Small Angle Neutron Scattering at Bombay, India (17-28 April 1995).

### **4.2 Energy and Nuclear Power Planning**

Thailand's power demand is increasing at least 1000 Megawatt (10%) per year and is projected to reach 17,685 MW by the end of the year 2000 and 29,321 MW in the year 2006. Fortunately, there still a few options to ensure supplying adequate electricity in Thailand, i.e. a) import coal and natural gas b) import the electricity from the neighboring countries and c) from the private sectors (Independent Power Producers : IPP about 3800 MW within the year 2003.

The nuclear option is still pending for cabinet's decision but it was later reshaped under the Seventh National Economic and Social Development Plan (1992-1996), that to educate the public on the importance of nuclear energy and to promote the nuclear power project. EGAT has implemented two public relation programs, i.e. Public Awareness and Public Information and Understanding, while the next two programs will be launched succeedingly, i.e. Public Participation and Public Acceptance Programs. There are still a number of issues to be considered for final decision by the government namely ; safety, waste disposal, economic, engineering, regulatory framework, human resource development and public acceptance.

### **4.3 Nuclear Information System**

Thailand has participated the project on Nuclear Information System with started in 1994 through the INIS liaison officer. The activities in the early stage of the project are ; to assess the available information infrastructure, compiling information on the information resources at OAEP Library, sending the collection of nuclear literatures in Thailand

to the INIS secretariat in the work sheet form, which composes of Abstract, Literature and Bibliography.

#### **4.4 Maintenance of Nuclear Instrument**

Thailand has been participated in the RCA project of Maintenance of Nuclear Instruments for i.e., nuclear R&D instruments and nuclear medicine instruments. The main activation have been done during 1993-1994 were ; survey on status of nuclear medicine centres and nuclear medicine instrumentation in Thailand, especially the gamma cameras and SPECT systems.

### **5. RADIATION PROTECTION PROJECTS**

#### **5.1 Radiation Protection Infrastructures**

In 1994 OAEP organized 4 national training courses on Radiation Protection Level I and Level II. Hundreds of the participants were scientists, medical staffs and engineers from various institutes.

During February, 21-25, 1994, a representative from OAEP attended the IAEA/RCA Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples. According to this, Japan, as a host country, had prepared some environmental samples and distribute them to other participants via the IAEA.

OAEP had joined a joint IAEA/OAEP National Training Course on Radiological Emergency Planning and Preparedness during May, 6-20 1994. The objectives of the training course were to enable the radiation protection officers in various institute in Thailand to be acquainted with the recently established code of practices on the Emergency Planning and Preparedness for Accidents involving Radioactive Materials Used in Medicine, Industry, Research and Teaching as well as to be well prepared for handling the emergency situation. A number of 20 participants were attended the course.

#### **5.2 Reference Asia Man**

Though Thailand did not joint this project, some in-house activities were carried out in 1994. The R&D on the Studies Physiological Data, by a medical staffs in Chiangmai, has reached more than 50% of the project's proposals. The Organ Mass by Autopsy was also studied in 1994.

## **CONCLUSION**

On the regional basis, RCA cooperation, through various programs and projects, has provided a valuable opportunity to maximize the welfare of the people. Its benefits have been shared by RCA countries in the region. It is gratifying to note that these benefits have been increasing both absolutely and relatively. Thailand is happy and proud to share with all of RCA member states various innovative approaches that have been initiated for further expansion of the activities to ensure the prosperity of the country and the region.



**COUNTRY STATEMENT OF VIETNAM**  
**17th RCA WORKING GROUP MEETING**  
**27 - 30 March, 1995**  
**Kuala Lumpur, Malaysia**

Vietnam's delegation is very happy to be here to take part in this 17th RCA WGM with the presence of delegates from New Zealand and Myanmar - the new members of our RCA community.

First of all, we would like to express our gratitude to the Government of Malaysia for hosting the meeting with the excellent arrangement and the hospitality extended to the delegates.

Secondly, I would like to draw Member States' attention on the Agency's effort to move towards the integration of women in development objectives into its Technical Cooperation Programme, which is in line with the UNDP policy: Vietnam highly appreciates the concerns paid by Member States to women through all activities supporting the Agency's guidelines, for example, giving priority to women to take part in national, regional and international events; establishing and implementing projects taking care of women's health, women's career development. As a country with the traditional Oriental Culture, Vietnam has committed itself to the women's movement for peace, development and equality in the whole as well as in the field of Nuclear Science and Technology development. Therefore, Vietnam would like to call on member states present at this meeting to think over the matter so as more activities could be initiated.

Thirdly, I would like to express Vietnam's support to the new project on Technical cooperation between Developing countries (INT/0/060), which we found beneficial and compatible with the world's tendency in development.

Subsequently, a brief description of Vietnam's RCA activities in 1994 is given below.

**1. Environmentally sound project (UNDP/IAEA/RCA/RAS/92/073)**

One of the most remarkable activities under the framework of the project is the Mid-term-review mission to Vietnam, executed by Mr. K. Paul Steinmeyer,

Mr.C. K.Beswick and Mr. V. K. Iya, from 2 through 8 March, 1995. During the mission, a meeting was organized by VINATOM with the participation of the 3 experts and representatives of ministerial offices and governmental authorities responsible for Nuclear Science and Technology development in Vietnam, especially for the project implementation. At the meeting, a report on activities implemented in Vietnam in the Nuclear field, especially in the project programme was presented. The Government's authorities expressed clearly Vietnam's willingness to participate in the project and even to ask for the extension of the project for another 5 years after the project termination in 1996. The delegates affirmed the project impacts on the social life, and the national economy, though there had been a limitation due to the low development level of the country. The funding cut policy of UNDP was also mentioned at the meeting with the request to the UNDP to remain the fund located for the projects being approved rather than create any new project.

We believe that through the mission report, the UNDP and IAEA could well understand the real situation and endeavour of Vietnam in approaching project's objectives so as to make appropriate decisions and policy in the Technical cooperation Programme in promoting the use of Isotopes and Radiation in the region.

Regarding the project activities, the following points are focused.

i. Vietnam has gained benefits from regional events under the project. A number of scientists were trained and got opportunities to exchange knowledge, experiences of such nuclear techniques as: NDT, NCS, Radio tracers, radiation and Nuclear analysis. This has greatly contributed to manpower development in general as well as to promote those Technologies in the country.

Along with the regional training courses and workshops, the following national events were organized with the assistance of RCA programmes and the Government:

- + A National Seminar on Nuclear Techniques applied to coastal Engineering.
- + National Seminars on Radiation Sterilization of health care products, which were held in the south and the north of Vietnam.
- + A National Coordinators meeting for Radiation Technology,
- + 6 National Training Courses on UT and RT; 1 NW on NDE for concrete.
- + A National training course on waste management (NATs have their contribution).



ii. With the development of the national economy, the demand for applying nuclear techniques in various sectors has been increasing rapidly, which partly facilitate the promotion of the techniques. Namely,

- Radio tracer techniques have been used for damp leakage study at hydro power stations and the study of bedload transport by using Sc-46 labeled sand to fight against the sedimentation problem in Haiphong port.

- Radiation technology has increasingly and widely been recognized and used for sterilization and disinfection of products ranging from industrial agricultural sectors to medical sector. This resulted in the need to set up a new irradiation facility for sterilization in Ho Chi Minh City, which is in preparation process.

- NDT Society is being established with the acceptance of ISO standard 9712 as the National NDT standard. The technique has been used widely in civil engineering, road construction. Hundreds of metallic objects were qualitatively checked by NDT.

- More than 100 Nucleonic Control systems of cement plants and paper mills were repaired and renovated.

- The role of nuclear Analysis Techniques has been increasingly perceived in the country as an effective tool for air and water pollution monitoring. Using NAT, two air sampling stations have contributed to the study of air pollution in Ho Chi Minh City and Dalat by using INA and polarographic methods for element characterization of air particulate matters.

## **2. Medical and Biological Applications**

It would be said that Nuclear Techniques have been being brought into the social life significantly, in which there is a unquestionable contribution of all activities deployed under the RCA projects on nuclear medicine.

The implementation of the project on *Diagnosis of Hepatitis B by RIA* over last years has brought wide use of RIA tests to diagnosis, epidemiological surveys and clinical studies. The technique was introduced to various municipal hospitals in Hanoi, Hue, Thainguyen, Haiphong, Haihung to diagnose, and to ensure safety of blood transfusion as well as to carry out research on Hepatitis B. Concretely, the project activities in 1994 helped to screen 6200 blood on for HBs Ag with RIA assay and 2300 clinical samples were tested by RIA. There is coordination of various hospitals in the North of Vietnam in studying longitudinal follow up of Hepatitis B matters and alpha - foeto - protein in chronic HBs AG carrier and in patients suffering hepatitis. The crucial impacts of the project implementation to

the people's health care are: the introduction RIA techniques as an effective common method to hospitals in routine screening of blood donors for Hepatitis B diagnosis. RIA, IRMA techniques became familiar with physicians and technicians at hospitals

- Some RIA kits for monoclonal anti - HBs were locally prepared from bulk reagents provided by IAEA.

With respect to activities of the *project on Radiation Sterilization* we would say that the project has lead to the proposal for setting up the first tissue bank in Vietnam which has been submitted to the Ministry for Health for consideration. This is the result of constant efforts in recent years to widen the use of a range of tissue grafts sterilized by  $\gamma$ -radiation. The high percentage of safety in using  $\gamma$ -sterilized tissues has increased the demand of the tissues. Along with the promotion of radiation sterilization of tissue grafts (about 3000 units/year) QC process is also of our concern. An integrated system of tissue graft production and quality assurance based on the model ISO-9002 standards has been developed. Briefly, Vietnam now has focused its effort on tissue Banking Establishment and QC process.

Regarding the activity of the *project on Nuclear Instrument Maintenance*, VINATOM has moved a considerable step in acting as technical supervisor in repair, maintenance and quality control of nuclear devices, especially those of medical use through qualified staff trained by VINATOM and through RCA training courses. However, due to the lack of appropriate equipment provision, QC process has not been carried out properly. We appreciate the support of the project in supplying spare parts, which partly helped us in particular cases to face the local difficulties.

Vietnam has expressed its warm welcome to the *CRP on standardization of I-131 Treatment for Hyperthyroidism* and very much eager to participate in the programme. We hope one of our institutions will be accepted to take part in the programme.

### **3. Agricultural Applications**

Recently, 500 tons of tobacco leaves have been irradiated for mould control that could help to establish GMP (good manufacture practice) for treatment of raw material for the light industry. Research and demonstration test of food irradiation are going on, particularly, a new trial for insect control for ten tons of rice with different packaging. New experiments are being carried out on preservation of spices and shelf life extension of fresh mushroom in order to meet

export demand. The Hanoi irradiation centre in collaboration with the fruit and vegetable corporation, the Hanoi Union of food Companies has been studying the preservation procedures of onions, bananas by radiation at a pilot scale. The trial on irradiated onions at commercial scale is being now conducted. Vietnam now puts a great effort on the issue of a regulation of irradiated food, whose draft was submitted to the Minister for health for approval, and market development for irradiated food.

As a contract holder, Vietnam has participated in the *Project on Increasing the Yield and Nitrogen fixation Capabilities of Common Grain Legumes*. The crucial impact of the project is to make agricultural sector aware of the great potential of nuclear techniques, especially the use of breeding and mutation techniques.

#### **4. Research Reactor Utilization.**

Vietnam's only Nuclear Research Reactor in Dalat has effectively been utilized in a range of studies. Namely,

- A research on the utilization of experimental neutron channel has been carried out. Two filtered neutron beams have been extracted from the reactor, giving rise to thermal and quasi-monoenergetic neutrons used for nuclear data measurements and other applied purposes.

- Research on radioisotope and radiopharmaceutical production serving nuclear medicine and other users have gained merits in the country.

- Nuclear Analysis Techniques have been developed with the utilization of the reactor for getting environmental data, geological sample assessment

The utilization of Dalat Nuclear Reactor has really contributed to promote the role of Nuclear Techniques in the national economy as well as environment monitoring.

The Dalat Nuclear research Institute's reactor operation team has got lots of benefits from participating in this project, especially through the training courses held under the project programme.

#### **5. Energy and Nuclear Power Planning**

Vietnam warmly welcomes the split of project RAS/0/013 into two projects *on Nuclear Power Planning and on Energy, Electricity and Nuclear Power Planning*. Being at the stage of preparation to introduce nuclear power into the

country, Vietnam sees the participation in the project as a useful tool for manpower training and feasibility study of nuclear power introduction. Two national seminars on nuclear power planning and nuclear power introduction to Vietnam were held during last year.

## **6. Radiation protection**

The need to strengthen radiation protection infrastructure has become imperative in the country with the increasing demand for using nuclear techniques in various sectors of the economy.

Two national seminars on radiation protection regulations and one national training course on radiation protection in industrial radiography were held in 1994. Personal dosimetry service in the country has been promoted significantly along with the recalibration services for dosimeters.

Two institutions of Vietnam have actively participated in the Intercomparison programme of Radioactivity Measurement for Environmental sample.

Vietnam would like to participate in the second phase of the CRP on Reference Asia Man.

Vietnam appreciates the initiative to set up a regional project on *Storage and Planning for Disposal of Radioactive Waste* and would like to participate in it when it gets approved.

## **7. Conclusion**

6 years have passed since Vietnam actually engaged in RCA activities. It is evident that the national network for the coordination of the regional activities and the national one is constantly improved. In parallel, Vietnam's contribution to RCA has increased through hosting regional, national events. Vietnam would like to renew its support to RCA programmes and any initiatives to consolidate this mode of cooperation.

**PROPOSED RCA PROJECT ACTIVITIES FOR 1995**

<b>Field</b>	<b>Project</b>	<b>Technical Officer</b>	<b>Project No.</b>
Medical and Biological	Evaluation of radioactive iodine therapy for hyperthyroidism	T. Yamasaki	E1.20.14
	Radiation Sterilization of Tissue Grafts	J. Mircheva	RAS/7/003 E3.10.04
	Radioimmunoassay for Hepatitis B Diagnosis	R. Piyasena	RAS/6/018
	Care and Maintenance of Nuclear Medical Equipment	Y. Xie	RAS/4/008 E1.10.06 E1.10.07
	Strengthening of Nuclear Medicine in RCA Member States	G. Nair	RAS/6/022
Industry	Regional Project for Asia and the Pacific (RCA) on "Environmentally sound Technologies"	J.F. Easey (Project Officer)	RAS/8/068 RAS/8/069 RAS/8/070 (RAS/92/073)
	Sub-projects:		
	- Tracer Technology in Industry	B. Zatolokin/ I. Lewkowicz	
	- Non-Destructive Testing	B. Zatolokin	
	- Radiation Technology	V. Markovic	
	- Nucleonic Control Systems	I. Lewkowicz	
	- Nuclear Analytical Techniques	R. Parr	

**PROPOSED RCA PROJECT ACTIVITIES FOR 1995**

<b>Field</b>	<b>Project</b>	<b>Technical Officer</b>	<b>Project No.</b>
Agriculture	Public Acceptance of and Trade Developments in Irradiated Food	P. Loaharanu	RAS/0/022
Radiation Protection	Strengthening of Radiation Protection  Activities: - Intercomparison of Radioactivity Measurement  - CRP: Reference Asian Man Phase II	R. Griffith  P. Stegnar/ J. Larosa  R. Parr	RAS/9/006   ▪
General	Research Reactor Utilization  Strategies for Implementing Nuclear Power Programmes  Energy Electricity and Nuclear Power Planning  Development of TCDC in Asia and the Pacific	K. Akhtar  P. Molina  P. Molina  J.F. Easey (Project Officer)	RAS/4/011 F1.20.09  RAS/0/021  RAS/0/023  RAS/0/015

▪ to be assigned

**RCA BUDGET ESTIMATES FOR 1995 and 1996\***

Project No.	Title	Fund Source	BUDGET US \$k	
			1995	1996
RAS/0/015	Development of TCDC in Asia and the Pacific	TC IND ROK CPR	98.40 25.00 25.00 50.00	107.00 25.00 25.00 50.00
RAS/0/019	Nuclear Information Systems	TC	11.40	62.00
RAS/0/021	Strategies to facilitate Implementation of Nuclear Power programmes	ROK	62.60	79.20
RAS/0/022	Public Acceptance and Trade Development for Irradiated Food	a/* TC	(140.00) 71.40	(240.00) -
RAS/0/023	Energy Electricity and Nuclear Power Planning	TC	51.30	242.00
RAS/4/008 CRP: E1.10.06 E1.10.07	Nuclear Instrument Maintenance	TC	251.20	304.00
RAS/4/011 CRP: F1.20.09	Research Reactor Utilization	TC	99.20	38.00
RAS/6/018	Radioimmunoassay for Hepatitis B Diagnosis	TC	151.40	152.00
RAS/6/022	Strengthening of Nuclear Medicine in RCA Member States	AUL	122.00	***
RAS/7/003 CRP: E3.10.04	Radiation Sterilization of Tissue Grafts	TC	184.10	134.00
RAS/8/068 RAS/8/069 RAS/8/070 RAS/8/071 (RAS/92/073)	UNDP "Environmentally Sound Technologies"	TC AUL JPN UNDP MAL INS NZL THA IND	160.20 154.50 328.80 568.18 15.00 15.00 37.35 15.00 25.00	156.00 *** 351.60 858.24 20.00 15.00 37.35 15.00 25.00

Project No.	Title	Fund Source	BUDGET US \$k	
			1995	1996
RAS/9/006 CRP: J3.20.01	Strengthening of Radiation Protection Infrastructure	TC JPN AUL	122.00 66.50 110.00	108.00 94.00 ***
CRP	Evaluation of radioactive iodine therapy for hyperthyroidism	JPN	60.00	60.00
CRP	Reference Asian Man Phase II	**	-	(50.00)
CRP	Cancer Therapy	**	-	(50.00)
CRP	Agricultural Countermeasures	**	-	(50.00)
<b>Total</b>			<b>2,880.53</b>	<b>2,958.39</b>

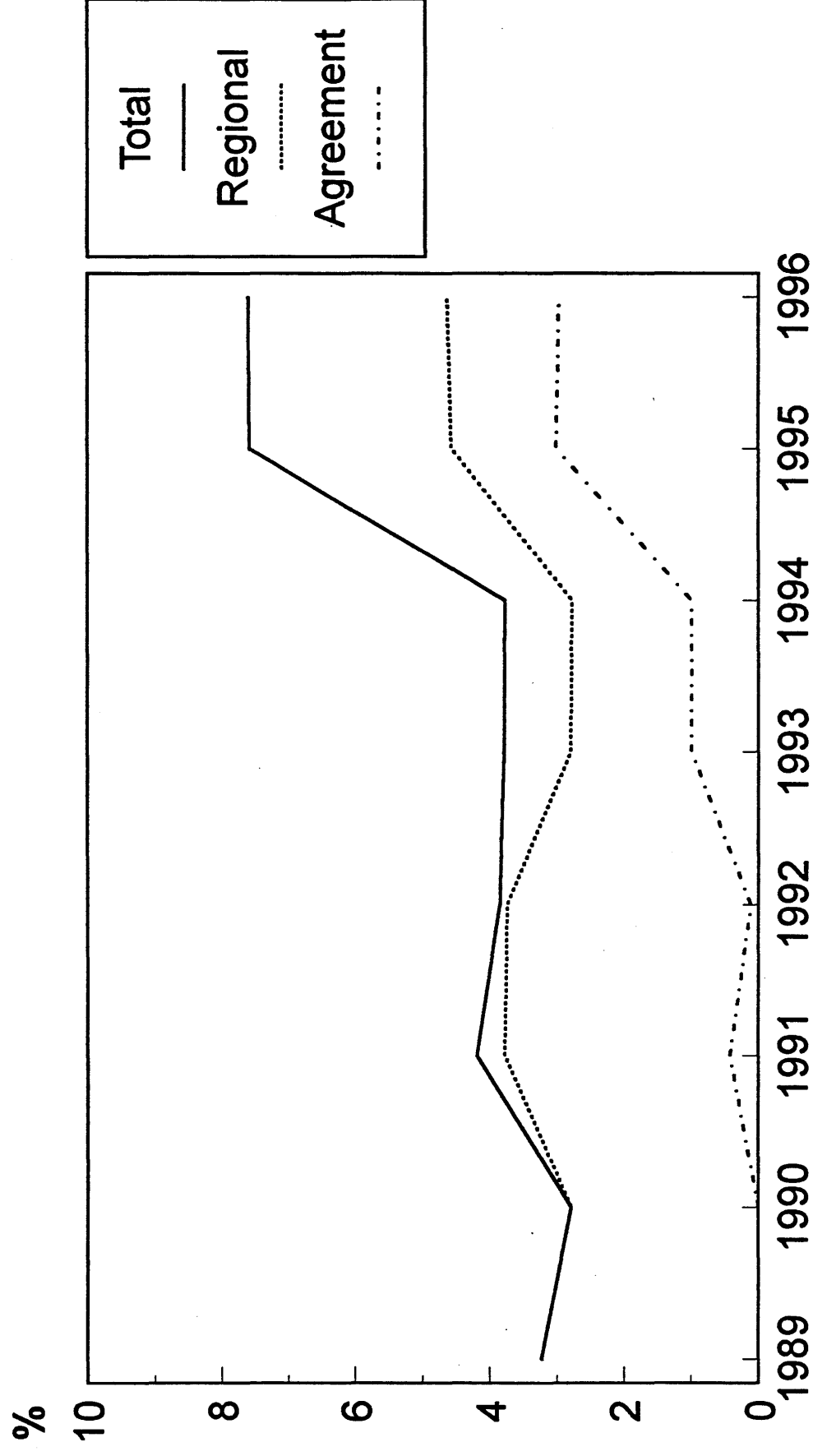
- \* Note these figures are estimates only. In particular they do not imply commitment by donor countries.
- \*\* Unfunded not included in Budget total.
- \*\*\* Projects will be completed during 1996 using funds from 1995 allocation.



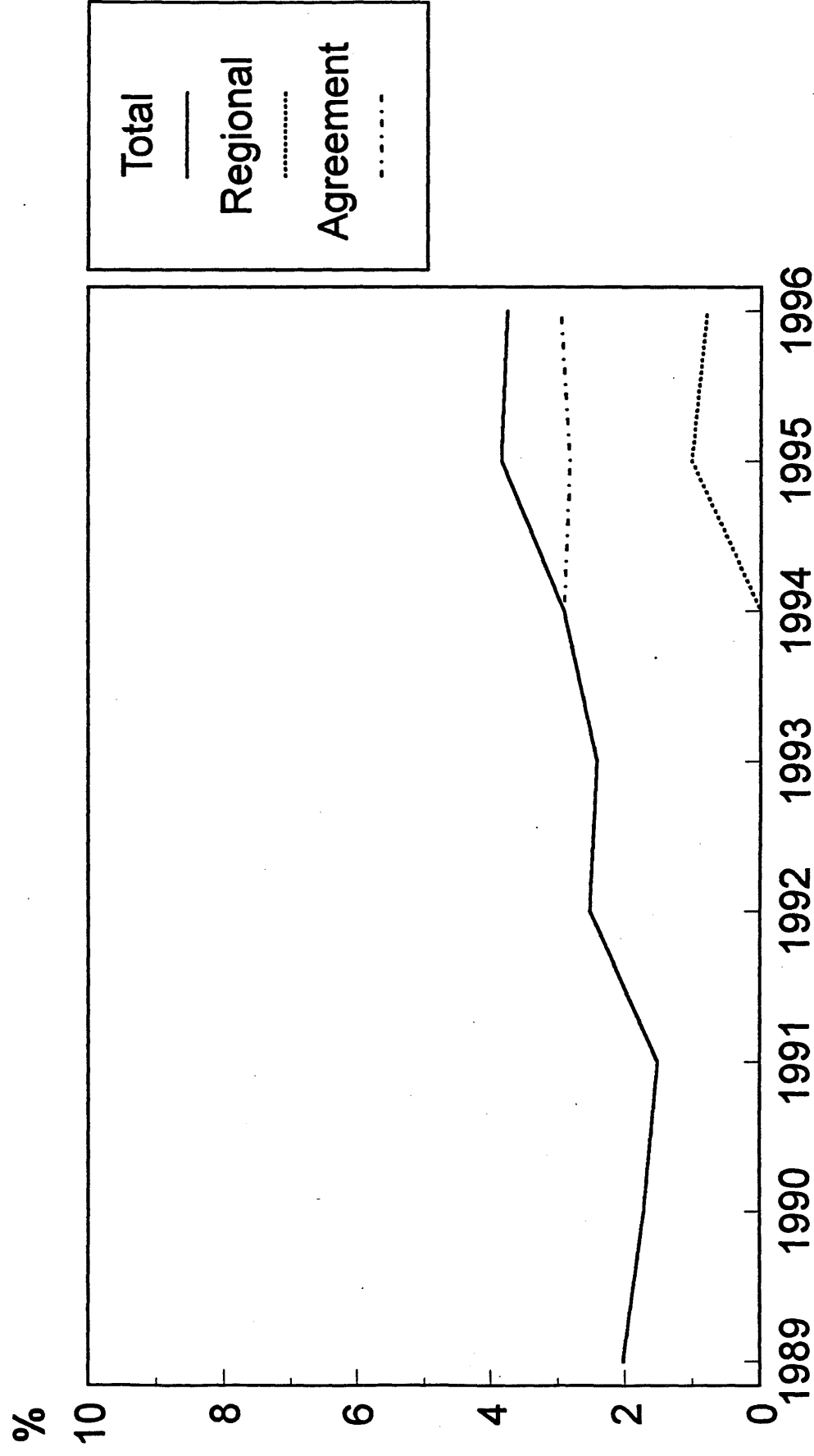
## **Percentage of TC Core Project Assistance given to Regions having Regional Projects as well as Regional Agreements**

- 1. Africa**
- 2. East Asia and the Pacific**
- 3. Latin America**

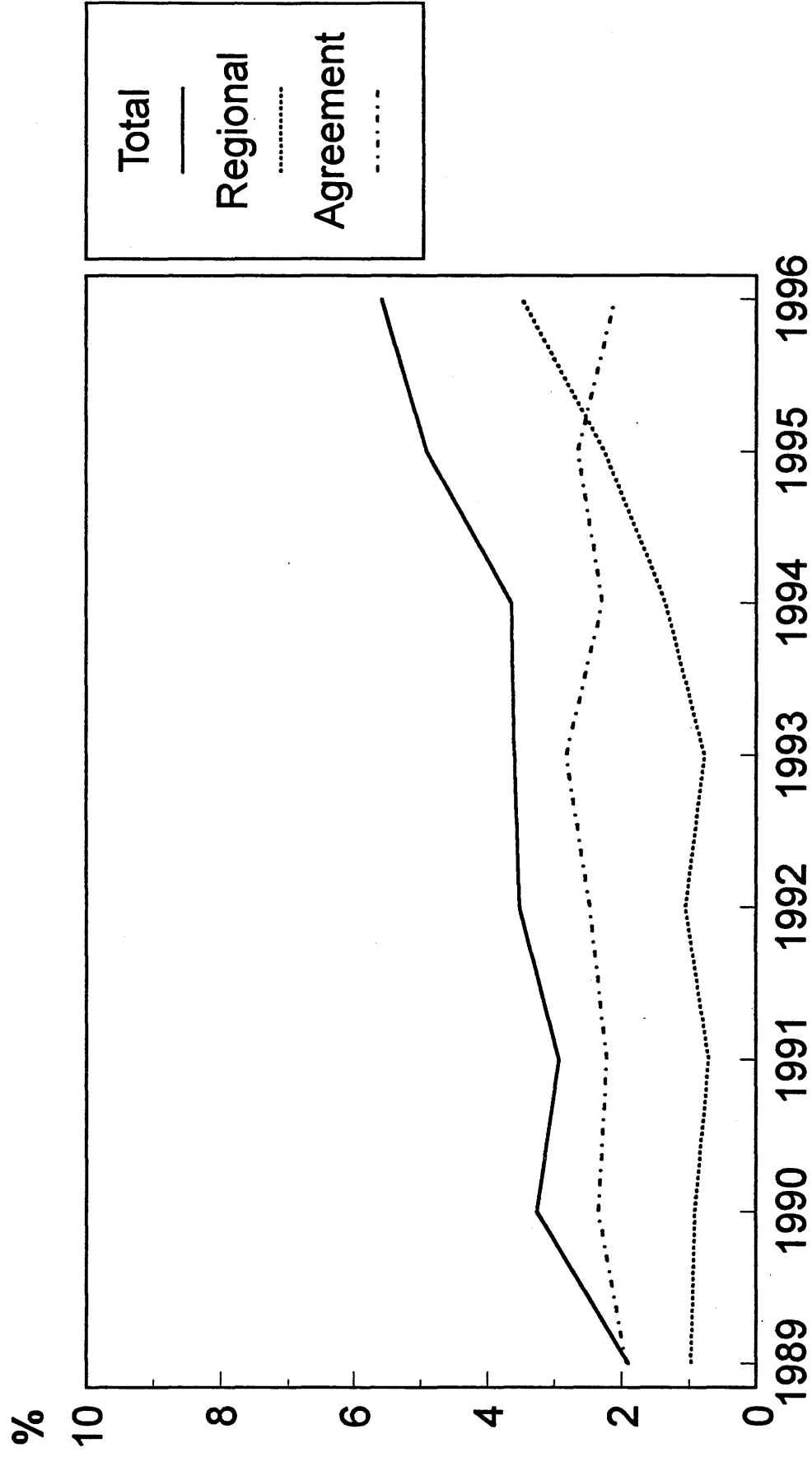
# 1. Africa



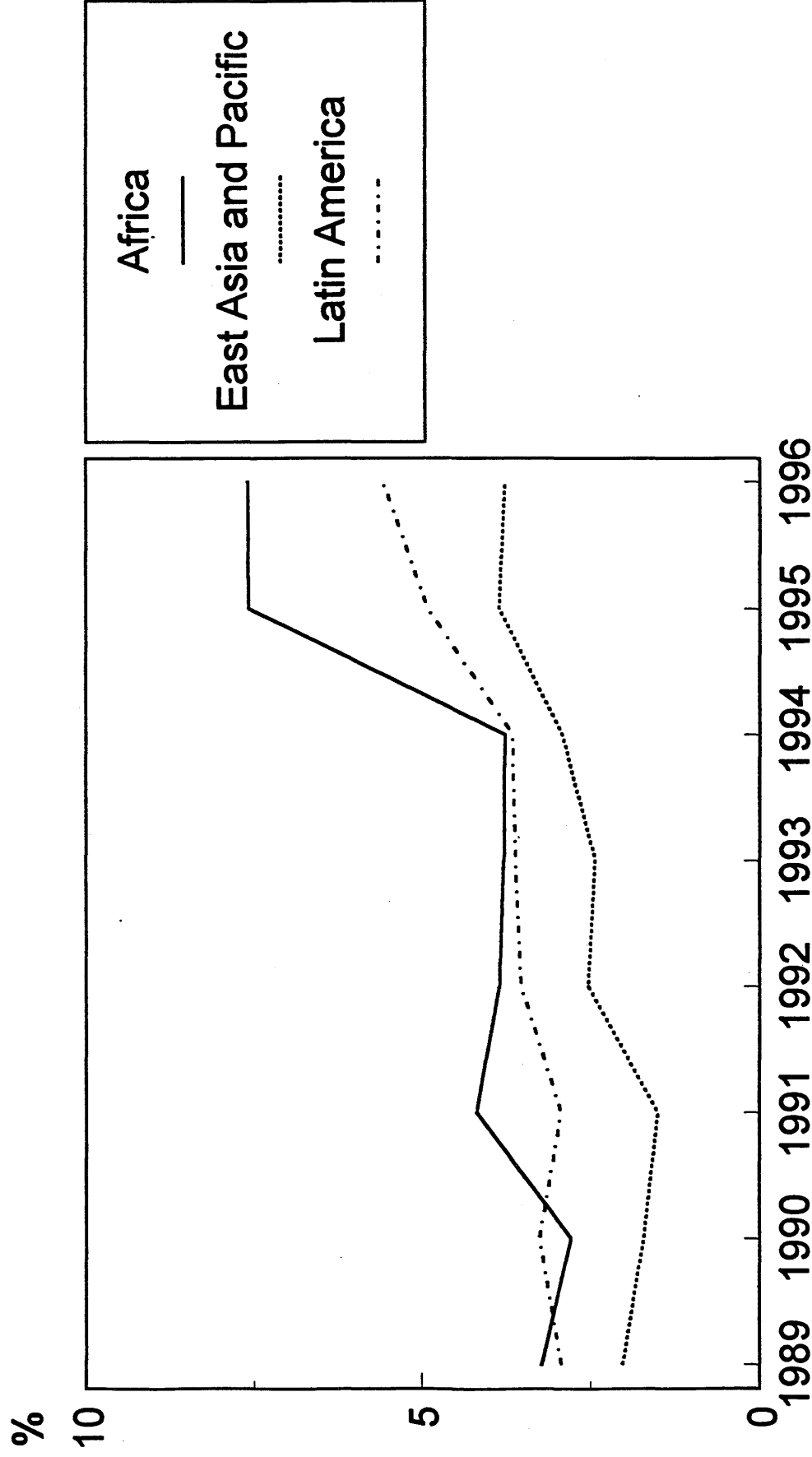
## 2. East Asia and the Pacific



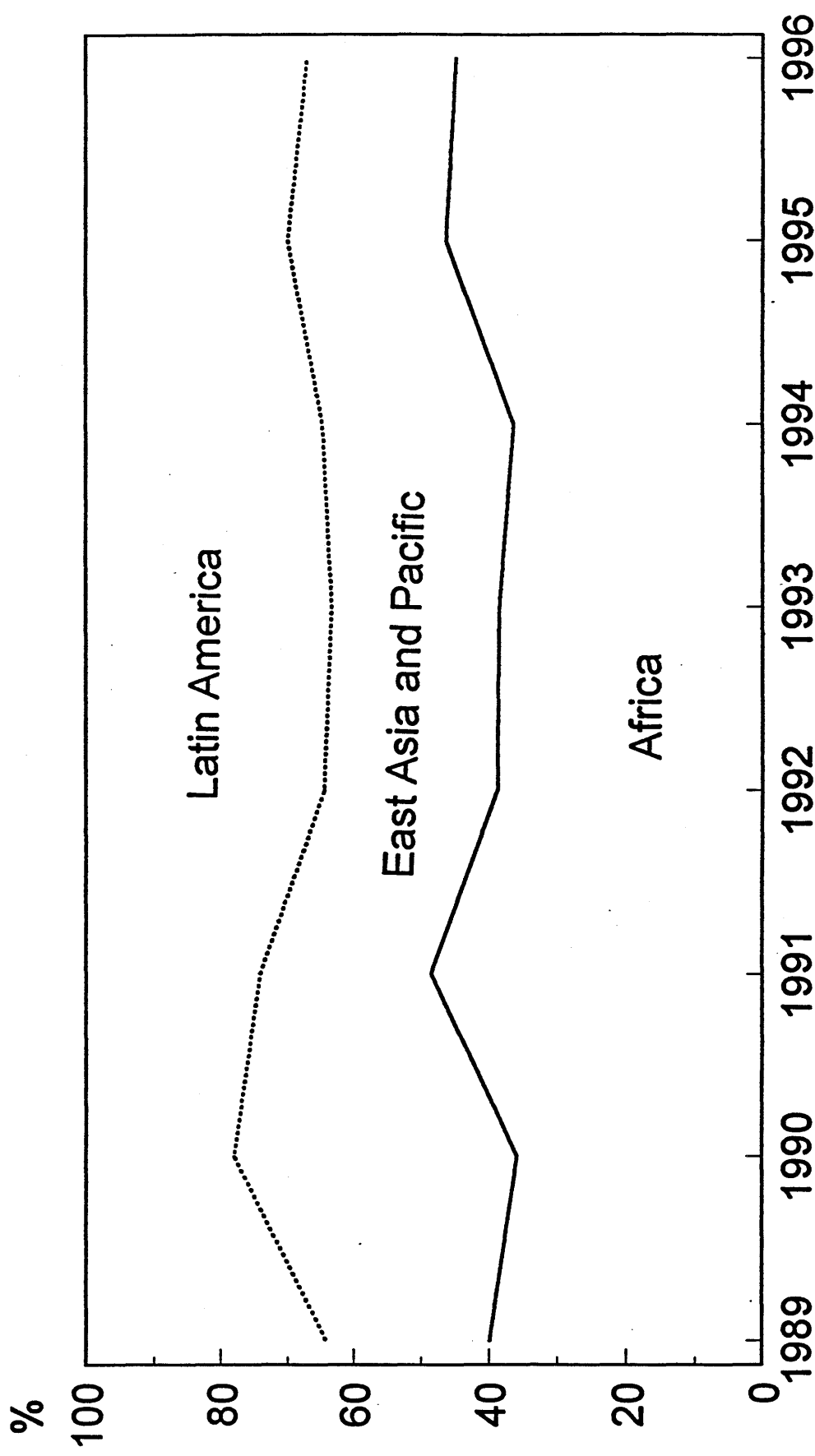
# 3. Latin America



# % of Total TC Resources to all Regional Projects with Agreements



# Distribution of funds between the three Regions having Regional Projects and Agreements



Africa				East Asia and the Pacific				Latin America			
	AFRA	Regional	Total	RCA	Regional	Total	ARCAL	Regional	Total	Grand Total	
1989	-	3.22 * (39.36)	3.22 (39.36)	2.03 (24.82)	-	2.03 (24.82)	1.93 (23.59)	0.97 (35.82)	2.93 (35.82)	8.18	
1990	-	2.78 (35.87)	2.78 (35.87)	1.72 (22.15)	-	1.72 (22.15)	2.34 (30.19)	0.91 (11.74)	3.25 (41.94)	7.75	
1991	0.42 (4.87)	3.76 (43.62)	4.18 (48.49)	1.51 (17.52)	-	1.51 (17.52)	2.22 (25.75)	0.71 (8.24)	2.93 (33.99)	8.62	
1992	0.11 (1.11)	3.73 (37.71)	3.84 (38.83)	2.53 (25.58)	-	2.53 (25.58)	2.47 (24.97)	1.05 (10.62)	3.52 (35.59)	9.89	
1993	0.99 (10.09)	2.79 (28.44)	3.78 (38.53)	2.43 (24.77)	-	2.43 (24.77)	2.83 (28.85)	0.77 (7.85)	3.60 (36.70)	9.81	
1994	0.99 (9.58)	2.77 (26.82)	3.76 (36.40)	2.92 (28.27)	-	2.92 (28.27)	2.29 (22.17)	1.36 (13.17)	3.65 (35.33)	10.33	
1995	3.01 (18.42)	4.57 (27.97)	7.58 (46.39)	2.83 (17.32)	1.02 (6.24)	3.85 (23.56)	2.65 (16.22)	2.26 (13.83)	4.91 (30.05)	16.34	
1996	2.97 (17.53)	4.63 (27.33)	7.60 (44.86)	2.96 (17.47)	0.80 (4.72)	3.76 (22.20)	2.10 (12.40)	3.48 (20.54)	5.58 (32.94)	16.94	

**\* Bold** : % of total TC Hardcore Programme (excluding Manpower Development)

\*\*\* (Parenthesis): % of all 3 Regional/Agreement Programmes

## TECHNICAL CO-OPERATION BETWEEN DEVELOPING COUNTRIES (INT/0/060) S3 New

### CORE FINANCING

YEAR	Experts		Equipment	Fellowships		Scientific Visits		Training	Sub-contracts	Misc. Comp.	Total US \$
	m/d	US \$	US \$	m/d	US \$	m/d	US \$	US \$	US \$	US \$	
1995	4/ 0	45,600	-	6/ 0	19,800	-	-	-	-	-	65,400
1996	6/ 0	72,000	-	6/ 0	20,700	-	-	-	-	-	92,700

First Year Approved: 95

**OBJECTIVES:** To facilitate the exchange of experiences between the three regional programmes AFRA, ARCAL and RCA.

**BACKGROUND:** For several years Regional Co-operative Agreements, known by the acronyms AFRA, ARCAL and RCA, have successfully carried out technical co-operation projects with the aim of establishing self-sufficiency in the use of nuclear technologies in fields such as industry, health, hydrology and agriculture in each region where the Agreements are being implemented. The projects emphasize the transfer of technology from the most advanced countries in the three regions to the less advanced countries in the same areas within the spirit of TCDC. In September 1993 a meeting of representatives of the three Regional Agreements was held at the Agency's headquarters to exchange accumulated experiences regarding the involvement of the end users and management strategies to accomplish the transfer. Furthermore, the Secretariat proposed to strengthen the management of these Agreements by providing the means for intense upstream activities in order to achieve even higher quality programmes. This will be implemented by sharing the cost of high level advisers to the President of the Agreements.

**REGIONAL COMMITMENT:** Each Agreement may provide a cost-free adviser, whose travel within the region will be sponsored by the Agency, to identify opportunities for good projects and possible funding sources.

**AGENCY INPUT:** Travel expenses of the cost-free advisers nominated by each Agreement, with a small allocation to support travel of national consultants working under the advisers' guidance.

**IMPACT:** These activities will lead to better and more timely formulation of regional projects, consolidation of government support and increased funding from other than the most frequent donors, such as development banks, UNDP, the World Bank, WHO, OECD/NEA, PAHO, IFFM, etc.



## TENTATIVE PROPOSAL

### BACKGROUND

Within Subprogramme X, the Agency has developed, in co-operation with other international organisations participating in the DECADES project, data bases and analytical software for enhanced energy/electricity planning. The main objective of these computer tools is to build capabilities for sustainable electricity system expansion planning in developing Member States. The increasing worldwide awareness of the need for sustainable planning has led to a very high interest from a large number of Member States in making use of the tools developed by the Agency as soon as feasible.

By mid-1995, both the electronic data bases (RTDB/CSDBs) and the electricity system analysis software (DECPAC) will be released to selected users for testing. A first user's group Workshop will be organised at the end of November 1995 at the Argonne National Laboratory (ANL), funded by the regular budget of NENP and with support from the USA Government to cover local expenses.

The DECPAC software builds on the well established WASP and ENPEP models which are distributed by the Agency and used by many Member States, in particular within on-going TC Projects. DECPAC, like WASP and ENPEP, uses a thoroughly proven approach to least cost electricity system expansion planning and has enhanced capabilities for assessing and comparing emissions and residuals from alternative electricity generation chains, i.e., fossil fuels, nuclear power and renewable sources. DECPAC is a user friendly computer tool running on PCs, which is designed for carrying out screening studies in support of policy making. Together with its supporting data bases (RTDB/CSDBs), DECPAC offers an integrated package that can be implemented and used, in particular in developing countries, with a limited effort in training.

In the framework of the CRP on "Case studies to assess and compare the potential role of nuclear power and other options for reducing emissions and residuals from electricity generation (CRP-II.40.01)", some twenty scientific teams, mainly from developing Member States and countries in transition, are carrying out studies on integrating economic, health and environmental issues into policy making for the power sector. Most of these teams will start using the DECADES tools during the second Semester of 1995. It would be desirable that the Agency provide some of them additional technical assistance in 1996 for enhancing their capabilities to use the computer tools for decision support studies in the power sector.

In this connection, it is proposed to incorporate in 1996, within some on-going national and regional Technical Co-operation projects on energy/electricity planning, additional assistance and training focusing on addressing environmental issues. The regular budget of NENP could be adjusted for this purpose, in particular by more manpower to the necessary technical support to TCAC projects on the use of the DECADES tools. However, **additional resources would be required from TC budget** (see details below) for supporting Interregional and regional training courses/workshops and missions for technical assistance on the implementation and use of the data bases and computer software.

### PROPOSED PROGRAMME and TC SUPPORT REQUIRED

#### 1. *Interregional Training Course*

It is proposed to organise an Interregional training course on "Incorporation of economic, health and environmental aspects in policy making for the power sector" in 1996. The two-week training course would be held at ANL, which in principle would be prepared to host it. Some 20 participants from 10 Member States would be invited.

The required TC funding for this training course would be US \$ 30,000, covering the travel and subsistence costs for participants. ANL and the USA Government would bear the local expenses and no external lecturers are required, other than from the Agency.

**NOTE:** From 1997 onward, it is planned to include such an interregional training course each year in the programme of energy/electricity planning training courses provided by the Agency.

## **2. Assistance to Member States**

It is proposed to incorporate, in some five operating TC Projects on energy/electricity planning, additional assistance in the field of comparative assessment of different energy sources for electricity generation taking into account health and environmental aspects together with economic and technical parameters. This assistance will provide on-the-job training in the use of new computer tools, i.e., data bases and analytical software developed by the Agency during the period 1993-1995 in the framework of the DECADES project. In particular, guidance and technical assistance would be provided for the establishment of country data bases (inventory of technologies for electricity generation currently used and expected to be implemented in the country in the coming two decades, covering technical and economic parameters as well as emissions and residuals).

A tentative list of the countries candidate for this additional assistance within operating TC Projects is given below:

Belarus [project BYE/0/003]

Pakistan [PAK/0/006]

Poland [POL/0/004]

RCA [project RAS/0/023]

The assistance would require one additional mission (one expert from ANL and/or from the Agency during one week) for each project.

The required TC funding for supporting these missions would be about US \$ 5,000 for each country.

## **2. Regional Training Courses/Workshops**

It is proposed to organise two regional training courses/user's group workshops, one in Europe for countries in transition and one in Asia for developing Member States of the region. Some 10-15 participants would be invited to participate in each workshop.

The required TC funding for supporting these Workshop would be about US \$ 50,000.

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