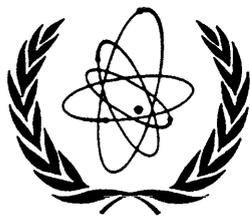


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REGIONAL CO-OPERATIVE AGREEMENT
INTERNATIONAL ATOMIC ENERGY AGENCY



REPORT

Fifteenth Working Group Meeting of Representatives of RCA Member States

Manila, Philippines, 16-19 March 1993

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FOREWORD

This report is a summary of the discussions and statements presented during the 15th RCA Working Group Meeting in Manila.

In the RCA Project Formulation Meetings carried out in 1992, it has been a standard arrangement to use the services of the Chairpersons supported by Rapporteurs to prepare summaries of the technical sessions. At the 14th RCA Working Group Meeting in Tokyo the Technical Session Chairpersons also prepared summaries of their sessions to assist in the preparation of the report. At this 15th RCA Working Group Meeting, Rapporteurs were formally assigned for the first time to assist the Technical Session Chairpersons to prepare summaries which are intended to reflect the broad themes of the session without reporting all the specific details presented by Member States during the discussions. The individual country statements, which are included in the Annexes, are the tabled record of Member States' performance and experience with the RCA programme and should be referred to in conjunction with the session summaries to give the full status of a particular subject.

FIFTEENTH RCA WORKING GROUP MEETING
MANILA, PHILIPPINES, 16 - 19 MARCH 1993

The Fifteenth RCA Working Group Meeting was held at the Shangri-La EDSA Plaza Hotel, Metro Manila Philippines, 16-19 March 1993. It was attended by 47 participants from 13 RCA Member States (Annex 1). Bangladesh and Singapore were not represented. There were in addition six observers from the Philippines. The IAEA delegation was led by Mr. Qian Jihui, Deputy Director General, Department of Technical Cooperation. The numbering of paragraphs in this report correspond with the number of the Agenda item.

INAUGURAL SESSION

1. Welcome Address on behalf of the Philippine Government

The Welcome Address was given by the Honourable Dr. Ricardo T. Gloria, Secretary, Department of Science and Technology. Secretary Dr. Gloria noted that this was the second time that the Philippines had hosted an RCA Working Group Meeting and expressed great pleasure at the growth and strength of the RCA programme over the time. He emphasized the importance of nuclear technology to the Country and that advantage had been taken of the opportunities to receive overseas training and experience. He hoped for continued expansion in the peaceful uses of nuclear technology especially in areas of Medicine, Energy Planning and Agriculture. He welcomed all the delegates on behalf of both the Government and his Department and hoped that everyone would have an enjoyable stay. The full text is in Annex 2.

2. Welcome Address on Behalf of the IAEA

In his welcome address on behalf of the IAEA, Mr. Qian Jihui, Deputy Director, Department of Technical Cooperation outlined initiatives he had taken to try to achieve a wider spread of nuclear applications projects which had relevance and application in the wider community such as industry, health care or national regulators. Many of these aspects were already a feature of the RCA programme and he wished to know more about the factors that made the RCA so successful. He outlined his thoughts on how regional demonstration projects might be expanded within the limited finances available and also made suggestions on how manufacturers might expand their markets for nucleonic equipment.

Before closing his remarks he mentioned that he would like to see the strengthening of links between the regional and country programmes to increase impact and maximize utilization of resources. He concluded by saying that he was looking forward to a productive and constructive Meeting with all delegates sharing their experiences to bring continued progress to the overall RCA programme. The full text is in Annex 3.

3. Welcome on Behalf of the Philippine Nuclear Research Institute (PNRI)

Dr. Carlito R. Aleta, Director, PNRI welcomed all the delegates to the Meeting and said that he was honoured that the Philippines was able to host this event and looked forward to the discussions on the RCA programme. He expressed pleasure that Mongolia has joined RCA and would be present at the Meeting.

He said that the Philippines was determined to play as large a part as possible in the RCA programme and would make, where possible, financial donations to RCA in addition to their "in kind" contributions. In this way, it was hoped to increase the role of Member States and achieve a more meaningful and a bigger commitment from them. The full text is given in Annex 4.

4. Keynote Address

The Keynote Address was presented by the Honourable Federico Macaranas, Undersecretary, Department of Foreign Affairs on behalf of Secretary Roberto R. Romulo who was currently accompanying the President on official visits to Japan, China and Indonesia. Undersecretary Macaranas said he looked forward to the continuation of further successful work with the extension of the RCA to 1997 and the entry of Mongolia.

He noted that nuclear power programmes were being planned in many countries of the region now. In addition to the existing nuclear power capacities in Pakistan, India, China, Republic of Korea and Japan, other RCA Member States such as Thailand and Indonesia had advanced plans for construction of nuclear power plants.

The participation of the Philippines in the wide range of RCA projects was noted and it was also pointed out that this had also had a very beneficial effect. The roles of the IAEA, UNDP

and the extrabudgetary donors in the financing and development of the programme was gratefully acknowledged. It was also added that although the Philippines had been a recipient in the past, it would be making its best efforts to become a donor of resources and, where possible, finance. He extended best wishes for a successful Meeting. The full text is given in Annex 5.

FIRST ADMINISTRATIVE SESSION

The interim Chairman, Mr. Wada of Japan, congratulated the PNRI for its marvelous work done on the planning of the 15th RCA WGM.

He noted the presence of the representatives from Mongolia last March as observers at the 14th RCA WGM in Tokyo and, following the Extension Agreement coming into effect in June 1992, Mongolia became a party to the Agreement in October 1992.

Following Mr. Qian assuming the position of a Deputy Director General for Technical Cooperation, IAEA in August 1992, RCA activities have progressed smoothly and actively. He mentioned the need for self-reliance within RCA and thanked the IAEA and RCA Member States for their contributions. The strong willingness of Japan to support the RCA was also noted. The full text of the remarks are given in Annex 6.

The interim Chairman called for nominations for chairperson for the Meeting.

5. Election of Chairman

Indonesia nominated Dr. Carlito R. Aleta, Director of the Philippine Nuclear Research Institute (PNRI), as Chairman of the 15th RCA WGM and this was seconded by Malaysia. Dr. Aleta was unanimously elected Chairman.

Dr. Aleta thanked the Interim Chairman. He also thanked Japan for hosting the last WGM. He acknowledged with thanks those who cooperated with the organizers of the Meeting - Department of Science and Technology, Department of Foreign Affairs, University of the Philippines System, Department of Agriculture, National Counterparts, National Coordinators, Project Leaders, and Non-Governmental Organizations all of whom had benefitted and are still benefitting from this programme.

6. Adoption of Agenda

Dr. Easey called the attention of the body to the typographical error on Item # 7 of the draft agenda, which should have read 1992 instead of 1993. Since there were no further comments on the agenda, it was adopted by the Meeting. The final Agenda used is given in Annex 7.

7. Draft RCA Annual Report, 1992

Dr. Easey made brief remarks on the Draft RCA Annual Report stating the most significant activities had been the extension of the agreement for another five years and the official participation of Mongolia as the 15th RCA Member State. He stressed the significant difference between regional programmes and national programmes, and regional priorities and national priorities. He concurred with Mr. Qian regarding the need for and the benefits of a strong network system of national project coordinators which should have the full support of national resources. Lastly, he mentioned the efficient use of resources and reviewed how the funding for the various areas of nuclear science and technology in the programme have been budgeted from 1987 to 1994. He urged the delegates to start thinking of the allocation of resources so that there would be a clear idea of target levels and this could be discussed during the next RCA General Conference Meeting in September 1993. The full remarks are given in Annex 8.

China expressed firm support for the RCA activities and is willing to host two Regional activities for a total of \$50,000.00.

Pakistan inquired whether the Regional Workshop on Radon Measurement Dosimetry and Application to the Study of Geophysical Processes (RCA Annual Report Annex 16b, Item 7) would go ahead. The RCA Coordinator reviewed the history of the application for this, noting that it was originally requested to be funded from RCA or Reserve funds. Since there was no appropriate RCA project on Geophysical Processes, the Reserve Fund option was investigated. Unfortunately, it did not meet Reserve Fund criteria. As a possible alternative option, the proposal was reviewed at the Expert Advisory Group Meeting on Radiation Protection Infrastructures in Beijing on 8-10 March 1993, but it was decided that it did not meet the needs of this project since the main emphasis was not directly related to the five priority areas

identified and further, all funds for 1993-94 had been allocated. Dr. Easey said he would make further inquiries to see whether there were any other possible mechanisms to allow the Workshop to be funded.

In connection with the establishment of the RCA Regional Training Course programme, Dr. Easey requested the cooperation of Member States in the preparation of the Draft Training Course list. He reminded the delegates that offers of assistance in financing and in hosting of regional training activities must be notified by October of the previous year even if they may be cancelled later.

In answer to a question from Pakistan on the meaning of the footnote to Annex 20 in the Annual Report concerning the latest commitment of donors to the budget figures, the RCA Coordinator confirmed that the donors had great difficulty in committing future year funding but historically, they had more than fulfilled their indicated assistance.

India confirmed the hosting of the 1993 Regional Training Course on "Trouble Shooting and Repair of Gamma Cameras". India would examine the possibility of hosting a Regional Training Course on the "Servicing of Nuclear Medical Equipment".

The Republic of Korea confirmed that they would fund a Regional Training Course on Industrial Application of Non-Destructive Testing and Evaluation in October 1993.

Because of some technical constraints, Malaysia regretted that it would not be able to host the RTC on Research Reactor Utilization as earlier anticipated. Indonesia confirmed that they would be able to take up this hosting.

Australia confirmed that they had full Government support for the RCA programme.

The RCA Coordinator emphasized his commitment to the maintenance and strengthening of the national counterpart and coordinator networks. He added that he would organize meetings of those relevant to the new joint UNDP/RCA/IAEA project as soon as UNDP funding was available. Consideration of the new project proposals would be deferred pending the outcome of the UNDP support for the joint project.

The Draft Annual Report was approved by the Meeting. Any further editorial corrections or amendments should be notified to the RCA Office by 1 June.

8. Election of Chairpersons for Project Committees

The results of the elections were as follows:

a. Medical and Biological Applications of Nuclear Techniques

Dr. Juan F. Torres, Jr.
Head, Nuclear Medicine Department
Philippine Heart Center & University of Santo Tomas
Hospital

Nominated: Sri Lanka
Seconded: India

b. Agricultural Projects

Dr. Alicia O. Lustre
Director
Food Development Center
National Food Authority, Dept. of Agriculture

Nominated: Thailand
Seconded: Pakistan

c. Nuclear Science and Energy Related Projects

Mr. Edilberto A. Cabalfin
Chief, Nuclear Services and Training Division
Philippine Nuclear Research Institute

Nominated: China
Seconded: Viet Nam

d. Radiation Protection Project

Mr. Domingo B. Domondon
Chief, Nuclear Regulations, Licensing and
Safeguards Division
Philippine Nuclear Research Institute

Nominated: Japan
Seconded: Australia

FIRST TECHNICAL SESSION

REGIONAL INDUSTRIAL AND ENVIRONMENTAL PROJECT

Chairman: DR. CARLITO R. ALETA
Director, Philippine Nuclear Research Institute

Rapporteurs: MS. ESTELITA G. CABALFIN
Head, Irradiation Services, PNRI

MS. FLORA L. SANTOS
Head, Analytical Measurements Research, PNRI

9. Report on 1992 Activities

The RCA Coordinator gave a report on the 1992 bridging activities, which were supported from the RCA Industrial Project extrabudgetary contributions from Japan, Australia, China, India and the Republic of Korea (Annex 9). As planned, these activities were realized without additional cost to the donor countries. The reasonable number of activities undertaken in 1992 was a significant demonstration that there is "life" after the end of the UNDP support for the project.

10. Report on the Status of UNDP/RCA Project RAS/92/073

In response to the Philippine inquiry about the status of the new joint UNDP/RCA/IAEA Regional Industrial and Environmental Project, the RCA Coordinator informed the Meeting that to date, no UNDP approval has been obtained. He also informed the group that revisions had been made on the budgetary requirement of the project, reducing it to a little below \$3 million to facilitate its approval by UNDP. This was made possible by deleting the 1997 component of the original proposal to bring it down to line with UNDP requirements. The Project Document, as submitted to UNDP, is given in Annex 10. Decisions on the related new project proposals were dependent on the outcome of the UNDP support.

Mr. Qian informed the group that Mr. Zacharia, Chief, Regional Asia Bureau, UNDP, was also in the hotel, attending an ADB meeting and that he was going to meet him. He expressed the opinion that Member States should make representations to the UNDP for the early approval of the project.

Australia informed the Meeting that, together with Japan, it has made representations with the highest UNDP office for the approval of the project. Japan reiterated its support for the new UNDP project and encouraged the RCA Secretariat to exert some more effort to accelerate its approval. Japan also asked for the RCA Secretariat's view on the possibility of implementing the environment related activities prior to the UNDP's final approval of their funding for the new joint project and wished to know what would be the basis and framework of such activities.

India endorsed the view given by Australia and Japan that, if the delay in approval continued, the region would lose the momentum generated by the Regional Industrial Project and this would have a negative impact on the prompt implementation of new project activities.

11. Report on the status of extrabudgetary programme funded by Australia and Japan

The details of the proposed extrabudgetary contributions from Australia and Japan were contained in the UNDP Project Document and their status could depend on the response of UNDP to project approval.

12. Concluding comments by Chairman

The Chairman said that he hoped that contact could be made with Mr. Zacharia while he was still in Manila so that there could be a clarification of the situation of UNDP support. On behalf of the delegates he asked that emphasis be given to rapid approval and again the importance of the Project to the region needed to be reinforced during any discussions.

SECOND TECHNICAL SESSION

MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

Chairman: DR. JUAN F. TORRES, Jr., M.D.
Head, Nuclear Medicine Department
Philippine Heart Center and Santo Tomas
University Hospital

Rapporteurs: MS. NYDIA C. MEDINA
Senior Science Research Specialist
Technical Assistance, PNRI

MS. ZENAIDA M. DE GUZMAN
Senior Science Research Specialist
Biomedical Research, PNRI

13. Constitution of the Project Committee

The Project Committee was constituted with Dr. Juan F. Torres Jr. in the Chair.

14. Medical and Biological Technical Cooperation Projects

At the invitation of the Chairman, the RCA Coordinator outlined the different projects/activities undertaken in the previous year. The status of individual projects under Medical and Biological Applications were noted as being included in the background documents provided for the present Meeting and comments were invited from the distinguished delegates (Annexes 10 to 14).

14.1 Radioimmunoassay for Hepatitis B Diagnosis (Annex 11)

India said that this was a very important project, also noteworthy because the supplies of the kits came from the region, China. Unfortunately problems had been experienced with the timely arrival of the kits because of delays with clearances. Some remedial action had taken place but this did not appear to have totally solved the problem. The full logistics problems will be presented at the Regional Coordination Meeting scheduled for Colombo, Sri Lanka in July 1993. Viet Nam reported similar experiences to India.

Malaysia thanked China for their involvement in this project. They, too, had similar problems to India and Viet Nam initially but, following discussions with UNDP, an improved distribution mechanism was achieved and no further late deliveries have been experienced.

Philippines reported problems with late deliveries and also a practical problem with only having three bead washers to look after the needs of four laboratories.

Indonesia reported that their kits had arrived on schedule and expresses their gratitude to China. China expressed appreciation for the information provided and would look at mechanisms for improving delivery.

14.2 Radiation Sterilization of Tissue Grafts (Annex 12)

The RCA Coordinator briefed delegates on the Project Formulation Meeting held in Manila in August 1992. He also requested feedback from Member States on the successes achieved in this area, since this would be able to be used to present a very positive aspect of the applications of Nuclear Technology that could be readily appreciated by the general public and also the social and financial benefits were very visible.

Viet Nam, India, Indonesia and China expressed their strong support for the project and gave illustrations of local usage of materials. Indonesia highlighted its work on freeze dried, radiation sterilized, amniotic membranes. Sri Lanka described their plans to set up a tissue bank but were limited because of the absence of national irradiation facilities.

The concept of a regional tissues bank was reiterated to address the problem of shortages of certain tissues in some countries due to religious reasons or local customs.

14.3 Computers in Technetium-99m Imaging (Annex 13)

A third Australian funded Regional Training Course was held in Sydney, 9 March to 17 April 1992. It was attended by 10 medical physicists from 9 RCA Member States. These RTCs have been very successful and Member States have requested further ones to be carried out.

15. Medical and Biological Applications, Coordinated Research Programme (CRP)

Japan expressed keen interest in receiving feedback on the extent of utilization of the project results both on the liver diagnosis study CRP and the CRP for cancer therapy of the uterine cervix, since both are in the second phases and are nearing completion this year.

15.1 "Imaging Procedures for the Diagnosis of Liver Diseases" Phase II (Annex 14)

Philippines described the activities that had been carried out during this second phase using nuclear and ultrasonic images. Mention was made of the need for quality control for both gamma cameras and ultrasonic phantoms that had been a part of the CRP.

15.2 "Radiotherapy of Carcinoma of the Cervix in Asia and the Pacific Region"
(Annex 15)

Japan informed delegates that some software developed for the CRP would be made available if requested.

15.3 "Radioaerosol Imaging for the Diagnosis of Respiratory Diseases" (Annex 16)

The radioaerosol imaging project was discussed and was generally agreed to have been most useful. An extension to the CRP had enabled studies to be carried out to correlate air pollution index with lung tracer clearance as an indicator of lung damage and/or disease, including its possible usefulness in the formulation of environmental control measures. The possibility of having the BARC developed nebulizer commercially available was posed and this was noted by India.

16. Medical and Biological Applications with Technical Cooperation Projects and associated Coordinated Research Programmes

16.1 Nuclear Instrument Maintenance (Annex 17)

The RCA Coordinator briefed the delegates on the results of the Project Formulation Meeting for the project which was held in Sydney in February 1993.

India mentioned that it would support a Regional Training course on gamma camera repair and trouble shooting from 30 August to 24 September 1993. India also commented that the Consultant Meeting on upgrading analogue gamma cameras held in Vienna and the Regional Consultants Meeting on "Utilization and further Modification of Computerized Management of Preventive Maintenance" held in Kuala Lumpur in September 1992 had been very useful events.

Japan expressed their comments contained in their Country Statement (page 3 paragraph 3) concerning the RCA Secretariat's request for Member States to nominate a national co-ordinator for the approved Technical Co-operation project RAS/4/012 "Nuclear Instrument Maintenance". The RCA Co-ordinator explained that in the Asia Pacific region there were two Technical Co-operation projects with the title "Nuclear Instrument Maintenance", one is the footnote a/ project RAS/4/012 referred to and the other is RCA project RAS/4/008. This latter project largely involved nucleonics in the Medical areas whereas the former involved nucleonics in both

the medical and non-medical areas. It had been a decision of the 1992 PFM that it was necessary to have two co-ordinators in order to cover technically the whole range of medical and non-medical activities in Nuclear Instrument Maintenance. With respect to them possibly covering the footnote a project RAS/4/012, he explained that this project had not been picked up yet and the question of whether it was in or out of RCA would depend on who picked it up. In 1992 there had been strong suggestions that an RCA Member State was considering picking it up and this was also at the time when the request for national coordinators was made. It was also a recommendation of the PFM that the activities of RAS/4/012 be merged with RAS/4/008.

17. New Project Proposals

The new project proposal on the evaluation of radioactive iodine therapy for hyperthyroidism (Annex 18) was presented for consideration. Japan expressed keen interest in supporting this proposed CRP, if the problem were identified by the RCA countries as a priority area. All the delegates expressed opinions that there was an overwhelming need for such an important and useful project within the framework of the RCA and requested Japan to further investigate the possibility of supporting it technically and financially.

18. Concluding Comments by Chairman

The Chairman thanked all the delegates for their contributions to the session. He expressed his support for the projects being undertaken which he felt were priority areas for the region and would contribute generally to the upgrading of health care.

THIRD TECHNICAL SESSION

AGRICULTURAL PROJECTS

Chairwoman: DR. ALICIA O. LUSTRE
Director, Food Development Center

Rapporteurs: MS. VICTORIA FE O. MEDINA
Senior Science Research Specialist
Technical Assistance, PNRI

MS. AVELINA G. LAPADE
Senior Science Research Specialist
Agricultural Research, PNRI

19. Constitution of the Project Committee.

The Project Committee was constituted with Dr. Alicia O. Lustre in the Chair.

20. Technical Cooperation Project and CRP Components

20.1 Food Irradiation Process Control and Acceptance (RPF1 III) (Annex 19)

Pakistan, China, India, Australia, Indonesia, the Republic of Korea, the Philippines, Viet Nam, and Thailand reported encouraging achievements in the Project. Progress in one or more aspects such as commercialization, marketing and consumer acceptance, new facilities, technical transfer, preparation of legislation and regulation, approval of irradiated foods and researches on various commodities were reported.

China reported they had initiated an inter-country trade test with Sri Lanka, Malaysia and Pakistan participating. It was interesting to note that China now has a facility that is dedicated to food irradiation. Republic of Korea informed the meeting they now have a total of 17 kinds of irradiated food approved for gamma irradiation. The prohibition by the Korean Government of the use of ethylene oxide for decontamination augured well for food irradiation. The Philippines reported the interest of private sector to put up a commercial irradiation facility.

In view of the very encouraging results of the Project, Pakistan inquired if the Agency could consider providing a commercial demonstration plant.

Viet Nam inquired about the Resolution on the Commercialization of Irradiation adopted by the IAEA Board. Mr. Qian informed the meeting that four countries, namely: China, Morocco, Chile and Mexico had been selected as the candidate countries for commercialization. The countries were urged to look to the Agency for software assistance and the private sector should be tapped to provided the hardware.

Viet Nam stated that they have less of a problem on public acceptance but their problem is more on cost-benefit aspects. In Africa, the private sector has shown that food irradiation of basic commodities like yam is viable. Thailand reported exploring the market testing of rice and mungbean.

The Philippines pointed out the need to explore regional procurement of the radiation sources as they contributed to the high cost of putting up a commercial irradiation plant. However, India pointed out that unless the design of the facility is also indigenous to the region, procurement of the radiation source could also be difficult. It was also pointed out that the seasonal nature of the food items being irradiated necessitated the establishment of multi-purpose facilities undertaking other irradiation work to make the plant viable.

20.2 Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen (Annex 20)

The Philippines reported the identification of five high nitrogen-fixers. Five strains of Rhizobium will be tested for hybridization work and tested in acid soils.

Pakistan reiterated its suggestion that studies of rhizobia and soil microflora using biotechnological tools should be undertaken and stated that it is prepared to participate in such studies.

21. New Project Proposals

Four project proposals were put forward for consideration (Annex 21), namely:

1. Use of Sterile Insect Technique to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies
2. Amelioration of Environmental Pollution By of F-1 Sterility for Controlling Caterpillar Pests of Horticultural Field Crops

3. Establishment of a Regional Rinderpest Sero-monitoring Network in Asia in Support of the South Asia Rinderpest Eradication Campaign (SAREC).
4. Banana Improvement in Asia: Integration of Mutation and Related Technologies into Conventional Breeding.

China and the Philippines expressed interest in the projects on sterile insect technique and mutation breeding.

It was pointed out by the RCA Co-ordinator that, as last year, the problem of incorporating these projects proposal into the RCA programme was caused by an absence of funds. He also drew the Meeting's attention to the fact that there were no Agricultural projects with approved funding beyond 1995. There was general agreement on the need to identify and prioritize what regional projects in agriculture should be undertaken, taking into consideration the limited RCA funding and the need to close RCA projects so that funds can be used for new ones - the knockdown and rebuild principle.

It was agreed that the new projects selected for the future programme should represent the highest priority regional needs. It was important for consensus to be reached on such requirements and these should be properly considered and a reflex response should be avoided. The most effective means of achieving these aims was believed to be, first, the review of the new project proposals that might arise from a full consideration of the national and regional needs. It was suggested that a special half day session could then be arranged at the time of the next RCA General Conference Meeting in September 1993 to consolidate and formulate the Member States' responses to the future regional needs and priorities. It was hoped that the IAEA/FAO technical officers from relevant areas would be able to assist at this meeting by providing additional inputs especially on this strategy. The RCA Coordinator was asked to make the necessary arrangements.

22. Concluding Comments

The Chairwoman acknowledged the very interesting discussion and expressed appreciation for the active participation of the delegates. Although no consensus had been

reached on the new project proposals on the floor, there was general agreement to re-consider these and consult with the local experts so that a better idea could be conceptualized during the special session for agriculture during the General Conference. She also acknowledged the valuable suggestions and useful recommendations of Mr. Qian and Dr. Easey in determining the priorities of the region.

OTHER MATTERS:

The RCA Coordinator reported on his talk with Mr. Zacharia regarding the project proposal on the Regional Industrial and Environmental Project submitted to UNDP. He gathered that there were problems with general UN funding and there might be cash flow problems especially in 1995-96. Mr. Zacharia assured him that the RCA project proposal should not be affected by this cash flow problem, since only around \$700,000 per year was involved. The RCA Coordinator reported that the UNDP authority-to-proceed regarding this project might be obtained in April, 1993.

The RCA Coordinator then suggested that discussions on strategies for this project might be an additional agenda item in the afternoon's session. Australia suggested that the RCA Coordinator prepare alternatives for discussion in the afternoon; specifically, that he prepare charts on strategies to implement activities. The RCA Coordinator replied that he would prepare what he could.

FOURTH TECHNICAL SESSION

RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS

Chairman: MR. EDILBERTO A. CABALFIN
Chief, Nuclear Services and Training Division, PNRI

Rapporteurs: DR. CORAZON C. BERNIDO
Head, Nuclear Training, PNRI

MS. ESTELITA G. CABALFIN
Head, Irradiation Services, PNRI

23. Constitution of the Project Committee

The Project Committee was constituted with Mr. Edilberto A. Cabalfin in the Chair.

24. Research Reactor Technical Cooperation Project

24.1 Research Reactor Utilization (Annex 22)

The RCA Coordinator commented that he would like to have a Project Formulation Meeting this year for this area to look at Member States' requirements for the next five years. The output would be a project document which would contain a more focused five year project programme. Republic of Korea reported that their Multi-Purpose reactor under construction will operate in 1994. Republic of Korea offered to host the Project Formulation Meeting in October or November 1993. India informed on its plans to conduct a Regional Workshop on Applied Aspects of Neutron Scattering at the Bhabha Atomic Research Center between 22 November and 10 December, 1993. The Workshop will be organized from India's extrabudgetary contribution to RCA. This timing might be considered when the date for the PFM was being finalized. China reported that, in 1992, they organized two activities: the Regional Workshop on Neutron Transmutation Doping Technology and a Regional Training Course on Materials Characterization Using Low and Medium Neutron Flux Reactors. As a follow-up, a Regional Course will be conducted in September, 1993 on Nuclear Methods in Materials Development by the China Institute of Atomic Energy. Indonesia stated that a Regional Training Course on Research Reactor Utilization is to be held in September. It has been endorsed by the Indonesia Government and an official letter of acceptance had been sent to the IAEA.

25. Energy Based Technical Cooperation Projects.

25.1 Energy and Nuclear Power Planning (Annex 23)

Pakistan reported on the Regional Training Course on Electric System Expansion Planning conducted in Lahore from 26 April to 4 June, 1992. The course had 22 participants and seven observers. It was strongly felt that this type of activity should be continued in the future. The RCA Coordinator commented that, as a result of that training course, there is a plan to hold a Project

Formulation Meeting on this topic area. In his recent travels in this region, there were several examples of power generation problems and so further efforts on power planning on a regional basis seemed important. The Project Formulation Meeting will look at the aims and objectives of this project and plan a focused program for the next five years. This will be sometime in July, 1993. As soon as the dates could be confirmed, the counterparts, one from each country, will be notified. China observed that the energy planning project is important in the region, and many countries are in the stage of making their energy plans for the next decades. In China, they have used the WASP and ENPEP models and they hope to conduct a training course or workshop on ENPEP sometime in the future. Indonesia said that, in principle, their country will have no difficulty in holding the Project Formulation Meeting in Jakarta in July, 1993. However, the official response will be communicated to the Agency. Sri Lanka reported that they benefitted from the training course, and that the WASP model has been used there for power system planning. However, the model has been found to have shortcomings when applied to hydro-based systems, so it was recommended that an additional module, which was already developed, be included in future WASP courses. Viet Nam said that they are in the stage of nuclear power planning, and have benefitted from using WASP; it was added that input data collection and processing was the more important and difficult task. The Philippines reported that this methodology is now being used by the National Power Corporation; unfortunately, nuclear power has not been included in their energy planning. The Philippines also said that the model concerns only the economic aspects of system expansion, and suggested that IAEA look into integrating health and environmental costs into the programme. If the total nuclear fuel cycle is considered, the risks from nuclear power are lower than other types of power generation, including hydro and coal plants. The environmental and health cost of power system expansion has not been included in the WASP model. Mr. Qian replied that this kind of model was not yet available, but the idea was good. He said he would make a proposal based on the proposal of the Philippines. Mr. Qian proposed that a well-prepared lecture based on the proposal of the Philippines, be included in future training courses, because information on the lower risks of nuclear power compared to coal and hydro were not well known by the authorities in many different countries. He proposed that the national decision makers be invited to attend this lecture. He asked the delegates to give the Agency feedback on whether WASP has been used for general power planning, not just in nuclear energy.

26. New Project Proposals

India stated that an objective of the Research Reactor Utilization Project could be to facilitate collaboration among research reactor institutes in the region to assure continued availability of irradiated target materials and irradiation services in cooperating Member States. He proposed that Member States be informed of the irradiation capabilities of the region's research reactors. The Philippines informed the group that the IAEA has a booklet on all the different research reactors all over the world. He suggested that IAEA could be requested to make a more detailed compilation of the capabilities of the different research reactors. The RCA Coordinator replied that he could relay this to the appropriate Technical Officer of IAEA, and added that a survey of the exact capabilities of research reactors in the Member States could be proposed as one component for the future programme to be discussed at the forthcoming Project Formulation Meeting.

27. Concluding Comments by Chairman

The Chairman said he would be very interested in seeing how the two Project Formulation Meetings will develop the programmes for the next five years and looked forward to reading the reports. He thanked the participants for their contributions which had been very useful.

FIFTH TECHNICAL SESSION

RADIATION PROTECTION PROJECTS

Chairman: MR. DOMINGO B. DOMONDON
Chief, Nuclear Regulations, Licensing and Safeguards
PNRI

Rapporteurs: MS. PILAR C. ROCELES
Head, Technical Assistance, PNRI

MS. EULINIA M. VALDEZCO
Head, Radiation Protection, PNRI

28. Constitution of the Project Committee

The Project Committee was constituted with Mr. Domingo B. Domondon in the Chair.

29. Radiation Protection Technical Cooperation Projects

29.1 Radiation Protection Infrastructure (Annex 24)

The RCA Coordinator made reference to the draft report of an Expert Advisory Meeting on Radiation Protection held 8-10 March 1993 in Beijing which had reviewed the priority areas established at the Project Formulation Meeting held at Tokai, Japan in June last year. Attention was drawn to the project action programme developed for the next five years which included Agency funding and the likely extrabudgetary input from some RCA Member States. Detailed activities to be undertaken to implement this action programme will be provided in the Meeting Report which will be distributed by the RCA Secretariat as soon as possible.

The extent of participation of each RCA country to the Radiation Protection Project was briefly discussed and there was a unanimous expression of strong support for the continued implementation of this high priority project, the need for which had been highlighted by radiation safety related events all over the world. An important recommendation from the Beijing Meeting, which was reiterated at this Meeting, concerned the need to incorporate radiation protection as an important component of all relevant RCA projects and activities.

A Regional Workshop on the Dosimeter Intercomparison was held in Tokai in October 1992. There was a measurable improvement in the technical capabilities in personal dosimetry and instrument calibration. There were some individual follow-ups required.

30. Radiation Protection Coordinated Research Programme (CRP)

30.1. Reference Asian Man (Annex 25)

Reports on the activities in this area were given by China, India, Philippines, and Indonesia. It was noted that the CRP was due to be concluded and the final Research Coordination Meeting would take place in China in 1993. Any recommendations on future directions would be included in the Meeting Report.

31. New Project Proposals

It was noted that there were no specific new proposals tabled for discussion. It was however pointed out that any new priority projects and/or activities to be pursued in this area have been incorporated in the draft report the Expert Advisory Group Meeting held in Beijing recently.

Specific activities to be undertaken in support of the project on "Strengthening of Radiation Protection Infrastructures" in the region have been briefly outlined by the RCA countries supporting these activities either "in kind" or extrabudgetary contribution to the RCA programme.

The delegates expressed appreciation to the donor countries, notably Japan and Australia, for their strong support to this project and hoped that this would be maintained if not increased in the near future.

32. Concluding Comments by the Chairman

The Chairman reemphasized the importance of the Radiation Protection in all the nuclear technology activities being carried out by RCA. He noted the details given in the EAGM report draft circulated to the delegates and thought that this would be the basis for a significant future programme. He thanked the delegates for their contributions to this important session.

COUNTRY STATEMENTS

As in previous years delegates had been requested to submit country statements in writing (Annex 26 to 37) and only make verbal comments if there were urgent matters to be brought to the attention of the Meeting. This practice was again agreed. No delegation had any urgent matter to raise.

Mongolia was asked whether there would be a country statement and, to mark their entry in RCA, whether they would like to make a verbal presentation. Mongolia replied that they had not prepared a statement on this occasion but they would like to make some general remarks. They informed the Meeting that in the last months there had been a substantial reorganization

of management responsibilities for nuclear science and technology and there was now a need to review the RCA projects to see which were going to be most appropriate to Mongolia's needs. There might be a small delay before they could be fully active while this assessment process was going on but the area of Nuclear Instrument Maintenance and, possibly, Diagnosis of Hepatitis B, might be rapidly identified as priority areas. Mongolia repeated that they were very pleased to be an RCA Member State and would endeavour to play a full role in the future.

SECOND ADMINISTRATIVE SESSION

34. RCA Action Plan 1993

The RCA Coordinator referred to the materials in the background papers (Annex 38) and reviewed the various topics. He also reminded delegates that there would be a further two Project Formulation Meetings in 1993, one for Research Reactor Utilization and one for Energy Power Planning. Offers to host these had come from Republic of Korea and Indonesia respectively, and administrative arrangements would begin shortly.

The Meeting approved the Action Plan for 1993.

35. RCA Cost Projections 1993

The budget and budget estimated for 1993-1994 are given in Annex 39. There was some discussion on specific budget lines.

The Chairman asked delegates for their opinions on the desirability of including 'in kind' contributions with the financial contributions so that a more realistic picture could be given of the total cost of the RCA programme. All delegates agreed that it would be impossible to carry out the present programme without the Member States 'in kind' contributions and that if all the costs had to be funded from the available budget, then only a small fraction of the programme would be viable.

Australia suggested that it was not in the spirit of RCA for countries to have individually listed their "in kind" contributions in a table. The RCA Coordinator elaborated on an aspect of the

problem of assessment. He also said that, because of other factors, some countries could not always be given all the functions to host that they requested. In this way their ability to make all the 'in kind' contributions they were prepared to give, was being reduced. In view of the difficulties discussed and the problems of assigning meaningful dollar costs to the 'in kind' contributions, it was generally agreed that the most effective way to show the contribution would be in terms of numbers of training events, expert assignments, fellows hosted etc. Mr. Qian suggested it could be useful to carry out an analysis of the cost of an activity with and without an 'in kind' contribution. The Meeting approved the 1993 budget.

36. Other Business

The RCA Coordinator reviewed the chronology of the joint UNDP/RCA/IAEA Project proposal for the delegates so that the implications of the UNDP delays in funding could be fully appreciated. He reviewed the decisions that had led to the setting up of an Expert Advisory Group Meeting in Vienna in December 1990 to prepare recommendations for a future RCA project funded by UNDP. He went on to review the recommendations made at the 13th RCA Working Group Meeting held in Ho Chi Minh City, March 1991, which set out the ten highest priority areas from those recommended by the EAGM and agreed that the project could not be funded solely by UNDP and would have to be set up with joint UNDP/IAEA/Extrabudgetary funding. This was subsequently endorsed at the General Conference Meeting held in Vienna.

The Project Formulation Framework (PFF) submitted to UNDP was a document agreed and endorsed by the RCA Meetings and the Project Document developed from it included all the activities that had been agreed and approved. Thus, although the Project Document had been submitted to UNDP, it was specifically for the UNDP component; financing the other components, such as the Australian proposals, had been agreed separately. The Project Document is therefore the description of the total project for which there are three funding components: UNDP, IAEA, and Extrabudgetary and the financial and legal framework of this UNDP/IAEA/RCA "Environment Project" is not parallel to that of the previous UNDP/IAEA/RCA Industrial Project. The extrabudgetary contributors would include Australia, China, India, Japan, Republic of Korea and Malaysia and any other Member States that wished to donate.

The RCA Coordinator said that Agency funds had been available since the start of the year and activities described in the Project Document were now being organized under extrabudgetary funding from Australia and Japan. He expressed the view that the project had started 1 January 1993 and, from the information available, the UNDP delay in approval was merely going to cause some slippage in that specific component but should not adversely distort the total effort. He added that, if the official start date were tied to the UNDP approvals, this could have an effect of undervaluing the true inputs to the total project.

Japan expressed its appreciation for the explanation provided for the first time and reiterated its support to this project. India suggested that the national counterpart and coordinator networks needed to be activated soon to ensure that the timetables were fine tuned and the activities firmed up. The RCA Coordinator said he would look at the possibilities of using some Agency funds for this purpose.

The RCA Coordinator informed the delegate from Pakistan that, following discussions with experts on the Regional Training Course proposed for support from Pakistan, referred to earlier in the Meeting, he was able to advise him that there was scope for it to be part of the future programme on Radiation Protection Infrastructures Project but the major emphasis would have to be shifted to the measurement and dosimetry of radon rather than the geophysical aspects of the radon measurements.

India referred to the RCA INIS project which will commence in 1994 and announced that they proposed to organize a Regional Workshop on INIS which would be funded from India's special contribution to the RCA. The two week workshop would cover subjects such as INIS input preparation, processing of INIS output tape, use of INIS CD-ROM, basics of personal computers and computer networking, basics of CD-ROM drives used in personal computers, on-line search and INIS input submission using E-Mail. Pakistan inquired about the structure of the Agency's support for this project and emphasized the importance of this topic to the Region. The RCA Coordinator replied that he had not yet received the details from the responsible Technical Officer but would get the proposed programme for distribution.

Indonesia said it would like to host the 16th RCA Working Group Meeting in 1994. Details would be provided later. Indonesia also announced that it would have no objections if other

countries wished to provide a Project Office to house the Chief Technical Advisor planned to be recruited as part of the new joint UNDP/RCA/IAEA project.

CLOSING SESSION

37. Acceptance of Draft Documents

The draft report was distributed to delegates and reviewed on a page-by-page, line-by-line basis. The RCA Coordinator said that the draft report would be circulated as soon as possible and all corrections should be notified by 1 June 1993.

38. Closing Remarks by IAEA.

The RCA Coordinator passed on apologies from Mr. Qian who had had to attend a meeting with the acting Undersecretary for Energy Mr. R.M. Bomasang and was unable to be present at this closing session. He went on to express his appreciation of the hard work and dedication of the PNRI Secretariat who had had the prime administrative responsibilities for supporting the Meeting and they had made a significant input to its smooth running efficiency. The Session Chairpersons and their rapporteurs were warmly congratulated for their contributions both in and out of the Sessions. Their summaries had been promptly and well prepared and it had been possible to present all delegates with report summaries at the Closing Session that covered all the deliberations and only this last session summary would need to be added to these materials.

The Government of the Philippines was warmly thanked for hosting this 15th Working Group Meeting and their sustained contribution to RCA over the years.

In conclusion the RCA Coordinator thanked all delegates for their positive and business like approach to the Meeting that had enabled a very full Agenda to be covered exactly on time.

39. Official Closing.

Speaking on behalf of the Chairman, Dr. Aleta, Ms. Eugenio thanked the participants for their efforts in making the Meeting such a productive occasion. She reiterated that it had been an honour and a privilege for the Philippines to host such an event. In closing she wished all participants a safe journey home and hoped that they would carry back good memories of their time in the Philippines.

THE WORKING GROUP MEETING
MANILA, PHILIPPINES
MARCH 16-19, 1993

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OPENING REMARKS

BY

THE HONOURABLE DR. RICARDO T. GLORIA *

SECRETARY, DEPARTMENT OF SCIENCE AND TECHNOLOGY

Distinguished delegates, Ladies and Gentlemen, good morning.

It gives me pride and pleasure to join this opening ceremony of the 15th RCA Working Group Meeting of Member States. This will be the second time that the Philippines is hosting this meeting, the first one was held in 1980 when only very few countries were involved. The regional co-operation, I was informed, dates back to 1972 but Working Group Meetings began in 1979.

Now, twenty-two years after forging the agreement, and thirteen years from the Philippines hosting of the Working Group Meeting and with several extensions of the agreement (the latest one in June 1992), it can be said that the RCA has grown stronger, not only in the extent of the commitment of its previous members, not only in the quality and the impact of the activities carried out within the region, but also in its membership.

Today, I would like to welcome specially the participation of new member country - - Mongolia. Mongolia was only an observer in last year's Tokyo Meeting. China and Viet Nam, on the other hand, became members only recently. I also learned that other countries including Myanmar, New Zealand and North Korea attended last September as observers. I hope we can say to all of them, welcome to the RCA club!

Nuclear Science and Technology has been the concern of the country as early as 1958 when the Philippine Atomic Energy Commission, which was the precursor of the Philippine Nuclear Research Institute, was created. In the initial stages of the nuclear energy development in the country, the government had sent many people abroad for more intensive training, usually in the USA and England which were then the English-speaking countries that were advanced in this field. Later, experts from America, Japan and India were sent to the country. And still much later, experts from Europe and America still come to the country but the bulk of these experts come from within the region, notably Australia, India and Japan.

* Delivered during the Opening Ceremonies of the 15th Working Group Meeting of the Regional Co-operative Agreement (RCA), 16 March 1993, EDSA Plaza hotel, Mandaluyong, Metro Manila.

We hope to see soon an exchange of experts not only from within the region and also to export them to other regions.

The RCA projects being undertaken and planned are mainly in Applications in Agriculture, medicine and Biology, Radiation Protection and Nuclear Research Reactor Utilization, Energy Planning and Industry. Lately, the possible approval of the UNDP project in industrial application and environment, is a much welcome news since the issue on sustainable development is very much in the forefront of things. In this regard, the issue of global climate change and greenhouse gases emissions seem to be a significant concern that is receiving attention worldwide. This region should also be concerned with the issue; nuclear energy, we believe, would play a big role in addressing this environmental issue, not only in the use of nuclear techniques in monitoring the greenhouse gases, but also in applications of nuclear energy which do not emit them, such as in power generation. We believe nuclear power is an option to be considered in the energy development of the country, and my department, that of science and technology, is doing some studies and plans to do other studies which would address the nuclear power development in this country as well as the social, technical, political and public acceptance aspects of the development. The nuclear power plant in BATAAN, which has remained mothballed until this time, could have added 620 MWE to the Luzon Grid, thereby avoiding the costly brownouts that is plaguing Philippine industries. The reality, however, is that this plant has become controversial and its fate depends on the court cases between the Philippine Government and Westinghouse.

Nuclear Power in the Philippines seems elusive at this point in time, but we believe not for long. Applications of Nuclear Energy for Environment is also a growing field that this region should also pay attention to seriously.

I hope that this Meeting will forge greater co-operation that would benefit our respective country's nuclear agenda geared towards our quest for total development by the 21st century.

Again, I welcome you to the Philippines and I hope that your Meeting will be fruitful and I hope you bring back with you fond memories of new found friends and of the Filipino hospitality.

Thank you and good day.

FIFTEENTH RCA WORKING GROUP MEETING, MANILA, PHILIPPINES

16-19 MARCH 1993

ADDRESS OF WELCOME

by

QIAN JIHUI, DEPUTY DIRECTOR GENERAL
DEPARTMENT OF TECHNICAL COOPERATION, IAEA

Distinguished Delegates, Ladies and Gentlemen,

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

The IAEA presents its compliments to the Government of the Philippines and expresses its gratitude for agreeing to host this Working Group Meeting. The Philippines is one of the founding fathers of RCA through the India-Philippine-Agency (IPA) agreement that started this all off in 1963 and it is with great pride that it should be the first developing country of RCA Member States to host this second round of Working Group Meetings that will take place annually at various RCA regional centres.

I am very pleased to be here at my first RCA Working Group Meeting. I have now been heading the Department of Technical Co-operation since 1st August 1992 when I succeeded Professor Noramly bin Muslim. In this time, I have tried to become more aware of the RCA programme not only because this is my region but also because of the significant continued successes that this programme is achieving. I wish to know more about why RCA is so successful, what are the key factors in its make-up that allow this to occur and how can these be transferred to other regional and national situations. One area that I am certain will have contributed to your success is the strong network system of national project counterparts. I believe it is very important to have good, effective national counterparts and I hope your Governments will continue to nominate high quality candidates. I also know that these counterparts cannot be effective unless they are properly backed by adequate Government resources so that they can perform their duties. I hope that all Governments will do their utmost to support these people in this important position.

I have been taking some initiatives within my Department that I think will interest you and are related to RCA. I hope we can discuss these further during our time together.

Within the TC programme of the Agency I am encouraging at all levels Member States, Agency Technical Officers and TC Area Officers to have much more focussed project objectives which will have an impact on the community beyond the narrow confines of the National Nuclear Centres and look to the end users whether this be an industry, health care programme or support of a national regulator. Thus I have been putting emphasis on what I like to call "Model Projects" and these need to have an output to satisfy the major need of a country and be oriented towards a definable end user group. As mentioned earlier there needs to be an immediately visible social or economic impact from the activities and the benefits from them should also directly reach the end user following the implementation of the projects. Such projects require a strong interest and commitment on behalf of the counterparts and they need adequate infrastructure to play their part. Many model projects because of their realistic formulation, aims and objectives, are also attractive for potential extrabudgetary support from international or governmental donors or organizations, as well as the private sector.

In many respects what I am trying to achieve is nothing revolutionary for RCA which has already established a strong reputation for successfully developing, organizing and implementing projects along this theme. I will need to use the RCA experience as an example when I am continuing the thrust of my general TC initiative. In many ways RCA has broken new ground in the approach to projects and I would like to encourage Member States to continue to be innovative and forward thinking.

To make the "model projects" spread as fast as possible, we are facing financial constraints. In the past RCA has had demonstration projects where an expensive piece of equipment was purchased from the project funds, installed at a suitable site and used for training and demonstration. Because of the large costs associated with the capital purchase only very few techniques could be considered for such a method of promotion. Continuing efforts must be made by the Agency's TC programme, as well as the RCA regional programme, to strengthen technology transfer to the end users by providing training, expert

benefit, operating needs, technological back-up, equipment reliability, and the like. Therefore, we are thinking to try to urge the nucleonic equipment manufacturers and suppliers in our region to be more inventive in their approach to expanding the commercial utilization of their products. I remember there was an interesting concept called "BOT" (build operate and transfer) model for NPP financial arrangement raised by Turkish Authorities. It could not be achieved because there was too much money involved as well as too many uncertainties. But "BOT" or lease contract has been a usual international commercial practice for many kinds of equipment trade arrangements. My Department would like to explore the possibility in this regard as a new approach to speed up our technology transfer.

Returning briefly to the overall RCA programme, my Department is thinking to further strengthening the linkages between the TC Country programme in Asia Pacific countries and the RCA regional programme to increase impact and maximize utilization of resources. One interesting area under consideration is the tissue bank project.

In conclusion, I hope all delegates will give us the benefit of their significant experience during the various sessions and I am certain that your wise counsel will enable us to achieve a productive and constructive Meeting with future benefits to the continued advancement of the overall RCA programme.

Thank you.

WELCOME REMARKS

by

DR. CARLITO R. ALETA

Director, Philippine Nuclear Research Institute

Distinguished delegates, ladies and gentlemen:

On behalf of the Philippine Nuclear Research Institute, I welcome all of you to this 15th RCA Working Group Meeting of Member States.

We are, indeed, honoured that the Philippines again plays host to this meeting to discuss mutual areas of interest in the peaceful applications of nuclear energy in our region.

We are pleased to learn that the RCA membership has increased with the inclusion of Mongolia late last year; we hope to welcome some day other countries in the region either as members or observers.

This meeting is privileged to have the presence of the "relatively new" IAEA Deputy Director General (DDG) for Technical Co-operation, Dr. Qian Jihui. As DDG, he is of course very instrumental in charting the course of technical assistance from IAEA, and in advising countries what programs/projects would likely be funded or not. And of course, we have Dr. John Easey, the IAEA/RCA Project Co-ordinator, who has been at the helm of this project for the past two years, and has been doing a commendable job. The presence today of the local UNDP representative, Mr. Kevin McGrath, is acknowledged since UNDP provides an important link in project implementation of these IAEA/RCA projects. We think this link should be further strengthened.

This meeting will discuss the progress of the various projects being implemented by the RCA, as well as consider new proposals and future direction or activities of the RCA. One such direction as pointed out by the DOST Secretary, is use of nuclear energy and nuclear techniques for sustainable development. Another direction is to address the need of the region in terms of nuclear power safety, since nuclear power in this region is becoming a very important energy source. We note with interest that the UNDP project on industry and environment has not yet been approved but we look forward to its speedy approval.

The Philippines has begun contributing modestly to the co-operative agreement in the form of voluntary contribution; we will continue to demonstrate further our commitment to this regional effort either financially or in-kind within the limits of our resources.

To the RCA delegates, permit me to say this: while our role for this meeting is to discuss the prepared agenda, our bigger role in the end is to ensure that the respective participation of our countries to this regional co-operation effort will not only be more meaningful and more sustained but also reflect better, if not more, commitment than before.

Thank you all and good day.

Keynote Address

By

The Honourable Dr. R.R. Romulo*

Secretary, Department of Foreign Affairs

**(Delivered by the Honourable Dr. Federico Macaranas, Undersecretary,
Department of Foreign Affairs)**

Your Excellencies, Deputy Director General Qian Jihui of the IAEA, Hon. Ricardo T. Gloria, the Secretary of DoST, Dr. John F. Easey, RCA Co-ordinator, distinguished guests, ladies and gentlemen;

It is an honor for us to be hosting this 15th Working Group Meeting of the RCA Member States. The history of this regional co-operation in the peaceful uses of nuclear energy spans more than three decades. Its early beginnings was with the IAEA-IPA project in the sixties which was a co-operation project between the IAEA, India and Philippines on the use of neutron spectrometry. The RCA Member States now number 15 with Mongolia as the latest addition. We welcome the delegates from Mongolia. The RCA Agreement has been extended to another five years from 12 June 1992. (I foresee that even beyond 1997 this co-operation would survive or continue since you just cannot put a good thing down).

The success of this RCA can be glimpsed from the efforts by other regions to co-operate among the countries therein. Lately co-operation in the African region has been organized after the RCA model.

The peaceful nuclear energy applications in the whole world are constantly increasing and in this region, activities in nuclear energy are more pronounced than in the other regions.

In nuclear power applications alone, while the number of plants in the United States and other European nations remain at a standstill, the countries in this region are either adding new power plants, constructing the plants or considering to put up nuclear power plants. Japan alone has 43 now in operation and is constructing more. Korea has 9, India has 7, China and Pakistan have 1 each and all are constructing/or planning additional ones.

* Delivered during the Opening Ceremonies of the 15th IAEA/RCA Working Group Meeting, Shangri-La EDZA Plaza Hotel, 16 March 1993).

Among the Asian countries in this region the Philippines has an almost completed one which is mothballed (and subject to litigation), Thailand is planning to put up 6 power plants, Indonesia 12, while Malaysia is considering nuclear power as a last option. More and more nations are turning to nuclear power which is considered an environmentally benign source of energy with relatively lower risks to the public and the environment than fossil fuels. We believe that nuclear power will eventually be harnessed for Philippine national development with or without the BATAAN Nuclear Power plant.

Among the good things the country has benefitted from the RCA are as follows: (to name a few examples only):

- The introduction of a methodology for energy planning exercises, in which nuclear power could be an option. The National Power Corporation has now adopted this methodology;
- The installation of a nucleonic control system for a mining company, which has contributed to the viability of the company's operations; the setup has also been used as demonstration center for training personnel from other countries in the region;
- The establishment of a national certification process for Non-Destructive Testing (NDT) personnel as well as their training on various NDT techniques, patterned after the international standard;
- Operationalization of a Graft Tissue Bank at a National Hospital (PGH) used by burn or orthopaedic patients;
- Adoption of radiation technology for medical sterilization and food irradiation, as a safe, economical alternative means to the conventional process. Industry interest is increasing in this technology;
- Medical protocols for diagnosis of diseases of certain organs (thyroid, kidney, etc).
- And many others.

We acknowledge the role of the IAEA, UNDP and donor countries in making the activities under the co-operation possible.

We look forward to sustaining and enhancing further the level of co-operation in this region.

The Philippines has been a recipient of RCA activities; we hope one day we could also be a benefactor or a donor, if not financially, then by making available to the RCA the technical expertise of the Filipino scientists and technologists.

Thank you.

**Remarks by Interim Chairman, Mr. M. Wada, Assistant Director,
Nuclear Energy Division, Foreign Ministry, Tokyo, Japan**

Dr. Qian,
Dr. Easey,
Distinguished delegates,
Ladies and Gentlemen,

On behalf of all the delegations, I have the honour and privilege to thank the Government of the Philippines for kindly inviting us to this 15th RCA Working Group Meeting. I would like to express my congratulations to the Philippine Nuclear Research Institute on its marvelous work done in planning, arranging and organizing this important meeting. I also wish to express my gratitude for its warm hospitality extended to us all. And I regard it a privilege for me to cordially welcome all the delegates to this session on behalf of the Chairman of the 14th Working Group Meeting, the former Director of Nuclear Energy Division of the Japanese Foreign Ministry, Mr. Yoshiyuki Sadaoka, whose promotion to another post made it difficult for him to be present at this Meeting with you.

Last year we witnessed yet another set of important developments in the history of the RCA co-operative framework. In March Japan had the privilege to host the 14th RCA Working Group Meeting, where Mongolian observers expressed their interest in joining the RCA co-operation. In June the Extension Agreement came into effect, giving the RCA life for another period of five years, and Mongolia became a Party later on to this Agreement, making us a group of the 15 nations with the purpose of promoting peaceful uses of nuclear science and technology. On behalf of all the RCA Member Countries, I wish to warmly welcome Mongolia to the RCA co-operative framework, and look forward to seeing Mongolia participating actively in the RCA projects. Now in August Dr. Qian assumed his post as Deputy Director General of the IAEA in charge of Technical Co-operation, to bring new winds to the activities in this field. With these developments the RCA activities progressed smoothly and continuously in various fields all through the year, manifesting the spirit of mutual co-operation, self-reliance, and understanding. As the interim Chairman I would like to thank wholeheartedly the IAEA and RCA Member Countries for their co-operation and contribution in 1992.

The RCA is expected more than ever to provide excellent opportunities for the promotion of peaceful uses of nuclear science and technology, with emphasis on the mutual transfer of technical skills, the development of human resources, and consciousness of nuclear safety and

radiation protection. I would like to take this opportunity to express the strong willingness of Japan to continue to support the RCA activities as ever.

Ladies and Gentlemen,

I hope that this Meeting will provide the opportunity for the making of new acquaintances, and will strengthen personal friendship between us all, and sincerely wish the best success to the 15th RCA Working Group Meeting in Manila.

Thank you.

A G E N D A

FIFTEENTH RCA WORKING GROUP MEETING
Manila, Philippines, 16 - 19 March 1993

Tuesday, 16 March 1993

09:00 **INAUGURAL SESSION**

1. Welcome on behalf of the Philippine Government
2. Welcome on behalf of IAEA by the Deputy Director General - Department of Technical Co-operation
3. Welcome on behalf of Philippine Nuclear Research Institute
4. Keynote address

10:15 Coffee Break

10:30 **FIRST ADMINISTRATIVE SESSION**

5. Election of Chairman and comments by Chairman-elect
6. Adoption of Agenda
7. Draft RCA Annual Report, 1992
8. Election of Chairpersons of Project Committees (Article VI of Agreement refers)
 - a) Medical
 - b) Agricultural
 - c) Nuclear Science and Energy Based Projects
 - d) Radiation Protection

12:30 Lunch

13:30 **FIRST TECHNICAL SESSION**

Regional Industrial and Environmental Project

9. Report on 1992 activities
10. Report on status of UNDP/RCA Project RAS/92/073
11. Report on status of extrabudgetary programme funded by Australia and Japan in support of RAS/92/073.
12. Concluding comments by Chairperson

14:45 Coffee Break

SECOND TECHNICAL SESSION

Medical and Biological Applications of Nuclear Techniques

13. Constitution of Project Committee

14. Technical Co-operation (TC) Projects
 - 14.1 "Radioimmunoassay for Hepatitis B Diagnosis"
 - 14.2 "Radiation Sterilization of Biological Tissue Grafts"
 - 14.3 "Computers in Technetium-99 Imaging"
15. Co-ordinated Research Programme (CRP)
 - 15.1 "Imaging Procedures for the Diagnosis of Liver Diseases" Phase II
 - 15.2 "Improvement of Cancer Therapy" Phase II
 - 15.3 "Radioaerosol Imaging for the Diagnosis of Respiratory Diseases"
16. Projects with TC and CRP Components.
 - 16.1 "Nuclear Instrument Maintenance"
17. New Project Proposals (if any)
18. Concluding comments by Chairperson

Wednesday, 17 March 1993

09:00 **THIRD TECHNICAL SESSION**

Agricultural Projects

19. Constitution of the Project Committee
20. Technical Co-operation Project and CRP Components
 - 20.1 "Food Irradiation Process Control and Acceptance" (RPRI III)
 - 20.2 "Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen"
21. New Project Proposals (if any)
22. Concluding Comments by Chairperson

10:30 Coffee Break

10:45 **FOURTH TECHNICAL SESSION**

Research Reactor, Energy Based and General Projects

23. Constitution of the Project Committee
24. Research Reactor Technical Co-operation Projects
 - 24.1 "Research Reactor Utilization"
25. Energy Based Technical Co-operation Projects
 - 25.1 "Energy and Nuclear Power Planning"

26. New Project Proposal (if any)
27. Concluding comments by Chairperson
- 12:30 Lunch
- 13:30 **FIFTH TECHNICAL SESSION**
- Radiation Protection Projects
28. Constitution of the Project Committee
29. Technical Co-operation (TC) Projects
- 29.1 "Radiation Protection Infrastructures"
30. Co-ordinate Research Programme (CRP)
- 30.1 "Reference Asia Man"
31. New Project Proposals (if any)
32. Concluding comments by Chairperson
- 15:00 Coffee Break
- 15:15 **COUNTRY STATEMENTS**
33. Receipt of Country Statements

Thursday, 18 March, 1993

Field visit.

Friday, 19 March 1993

- 13:30 **SECOND ADMINISTRATIVE SESSION**
34. RCA Action Plan 1993
35. RCA Cost Projections 1993
36. Other Business
- 14:30 Coffee Break
- 15:00 **CLOSING SESSION**
37. Acceptance of Draft Documents
38. Closing Remarks by IAEA
39. Official Closing

Comments by RCA Coordinator

Dr. J. F. Easey

Distinguished Delegates!

You have all been circulated with a draft copy of the RCA Annual Report for 1992. As previously mentioned at past meetings and also in the text, it has been written so that the necessary background information to RCA is incorporated in it, giving you a single document for your major reference source.

The most important single event in 1992 was the extension of RCA for a further 5 years. All past Member States have renewed their membership and we have an additional Member State, Mongolia, to bring our numbers to 15.

I do not propose to dwell on the substance of the report which, I believe, provides a suitable overview of our 1992 programme, which is progressing satisfactorily.

We need to remember that there can be quite different priorities between regional and national projects, and there is not always a link between the two. As an illustration, if we consider the topic of Non-Destructive testing, this has been actively pursued on a national basis for many years and would not merit priority in many countries' programmes. However, on a regional basis, where the emphasis is to provide regionally harmonized standards and certification, there is a very high priority for having this topic as part of our regional programme. In linking between regional and national, the individual objectives must be taken into account and the linkages should not compromise the ability of each project to meet its goals.

There are just three points I would like to mention. Firstly, Project Formulation Meetings last year have been used to tighten up and focus the aims, objectives, and outputs of the RCA projects on Nuclear Instrument Maintenance, Radiation Protection, and Radiation Sterilization of Tissue Grafts. The response from both participants and Agency Technical Officers have been very positive and supportive of the opportunity to enlarge the regional management and decision-making on the project structure. It is planned to have two further Project Formulation Meetings on Electrical and Nuclear Power Planning and Research Utilization in 1993. The PFM documents should enhance our ability to evaluate the projects during their execution and also allow quantitative outputs to be assigned.

Secondly, I have contacted all RCA National Counterparts asking them to confirm or provide the names for those nominated to be national coordinators for all the RCA Projects. Some projects will be having national coordinators for the first time. The existing network of national coordinators in RCA has been shown to be an efficient and effective mechanism for channelling project information, actions, feedback, etc., and has certainly contributed to the high level of success enjoyed in RCA. As Mr. Qian has pointed out, it is essential for these national coordinators to have the backing of adequate national resources to allow them to properly perform their functions. I believe it is important for the representatives from Member States attending this meeting to relay this message to their governments.

The last point concerns the use of RCA resources, and here, there are two issues: the efficient use of resources; and, the distribution of RCA resources to the various areas of nuclear science and technology. The PFM are making a substantial contribution to increase efficient use of resources. All inputs, be they from the Agency, UNDP, or extrabudgetary, are focussed into

supporting activities that will achieve a definable and achievable goal. The uncoordinated and the low priority activities are not included in the project and support is concentrated on the agreed priority areas.

Both Australia and Japan are considering financing regional training events outside their own countries to optimize the costs and they are looking at further linking of national country training and visits by experts so that the airfare costs can be reduced.

As was the case last year there are a number of new project proposals that have been put forward by Agency Technical Officers for consideration and possible support in future RCA activities. It must be emphasized that there is no implied Agency funding linked with these proposals. We are still in the position that projects will have to be cancelled to provide funds to support the incorporation of new projects. The "knock-down and rebuild principle" will have to be used since there are few prospects of using other means to expand the RCA budget in these tight economic times. In some cases, such as the three new proposals in Annex 3 of the briefing papers there are elements that are compatible with activities contained in the joint UNDP/IAEA/RCA new project proposal and these linkages could be developed during the coordinator meetings, which could essentially enable a proportion of these projects to be taken on without additional cost. These matters would be dependent on UNDP approval of the Project Document before them.

The distribution of the budget funds amongst the areas of nuclear technology needs to be discussed. It may be that a special RCA meeting is required to thoroughly debate the issues. I firmly believe that the RCA programme should be formulated with due regard to planned targets and should not arise by accident.

If the budget for 1992 is considered against the background of both percentage and actual dollar amounts for the period 1987 - 1994, it can be clearly seen that the level of extrabudgetary support to RCA is reasonably constant around 39.3%, with both UNDP and Agency support each around 30%, but a little less evenly distributed. Going to the technical areas, the Industrial Project used 50% of the budget for 5 years, 1987 to 1991, but, because of the ending of this project one and the start of the next, there has been a dip in the budget requirements. Agriculture seems to have had a long-term level of budget funding around 4%, with a recent four year surge because of the two UNDP funded projects in Food Irradiation and Nitrogen Fixation. Both Radiation Protection and Energy and Reactors show a slightly increasing budget over the past 8 years. Medicine has a wide variation in budget funds but the trend seems fairly level with an average of around 25%.

I hope that this information will give the distinguished delegates a perspective on the levels of funding for the various technology areas and that this will enable us to have a better appreciation of the past and present situations and hopefully, guide us to making recommendations for the future.

Thank you!

PROJECT BRIDGING ACTIVITIES IN 1992
TRACER TECHNOLOGY

DATE	VENUE	ACTIVITY	EXPERT
<u>DEMO/NEMS</u> 8 - 18 March 1992	Colombo, SRL**	Demonstration of Leak Testing of Pipe Line	Dr. Hu Xusheng Dr. Wu Yuanfane Dr. Zhou Shuxuan Dr. Lu Qingqian Dr. Sun Xiaolei
23 Aug. - 1 Sept. 1992	Kampujung*, INS	Demonstration of Tracers for measurement of gas flow	Australians (2)
14 Sept. - 9 Oct. 1992	Manilan, PHI* **	Demonstration of Tracers for measuring performance of waste water treatment ponds	Australians (2) Malaysians (2)

NON-DESTRUCTIVE TESTING

DATE	VENUE	ACTIVITIES	EXPERT
<u>REGIONAL WORKSHOPS</u> 13 - 24 January, 1992	Bombay, IND (India funded)	Image Processing in Material Science	
<u>EXPERT MEETING</u> 20 June - 18 July, 1992	Jakarta, INS*** Kuala Lumpur, MAL	Proficiency Testing Programme (PTP) Meeting I	Japanese (3) Australian (1)
10 - 17 Oct, 1992	Tokyo, JPN***	Proficiency Testing Programme (PTP) Meeting II	Japanese (2) Mr. R. Gilmour
<u>EXPERT MISSION</u> May/June, 1992	INS, MAL, ROK***	PTP Evaluation	Japanese (2)
<u>NATIONAL TRAINING COURSE</u> 13 - 31 July, 1992	Serpong, INS***	RT-3	Japanese (1)

RADIATION TECHNOLOGY

DATE	VENUE	ACTIVITIES	EXPERT
<u>EXPERT ADVISORY GROUP MEETING</u> 20 - 23 Oct. 1992	Takasaki, JPN*	Radiation Technology for Environmental Conservation	12 experts
<u>EXPERT MISSION</u> 13 - 23 Sept. 1992	Beijing, Zhuzhou* CPR	RVNRL	Dr. K. Makuuchi
<u>SCIENTIFIC VISITS</u> 18 Oct. - 21 Nov 1992	Jakarta, INS**	Trial Irradiation VIE Latex (2 x 1m/m)	Vietnamese (2)

NUCLEONIC CONTROL SYSTEMS

DATE	VENUE	ACTIVITIES	EXPERT
<u>REGIONAL WORKSHOP</u> 8 - 12 June 1992	Shanghai, CPR (Chinese funded)	NCS - Steel Industry	Japanese (1) Korean (1) UK (1)

* - Australian funded

** - IAEA funded

*** - Japanese funded

THE PROJECT DOCUMENT

**THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN TECHNOLOGY
AND SUPPORT ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT**

SECTION A: CONTEXT

(a) Description of the sub-sector

In industrialized countries, isotopes and radiation technology have been successfully applied to the needs of industry and the economic and technological benefits of this technology have been well demonstrated to varying degrees. Developing countries in the Asia and Pacific region have also begun to apply and develop this technology to support their industrial development. However, the sustainability of such technological development is dependent on the availability of indigenous trained manpower, backed by scientific and technical capability. Management skills in the introduction of new technology into industry and an effective mechanism for technology transfer to the industry are additional requirements.

The National Nuclear Research Institutes in the participating RCA Member States are responsible for the development of isotopes and radiation technology. Although the institutes have had some experience in liaising with industry as part of their national programmes and projects associated with IAEA programmes, further efforts are required to set up infrastructures that can be properly responsive to this important task.

In most Member States the regulatory provisions and the infrastructure for the control and safe use of ionizing radiation (including radioactive materials) is well established. The updating of regulations in conformity with upgraded international standards is on going and the adoption of such standards is a key element in ensuring safe, efficient and effective utilization of these technologies by industry.

Industrial acceptance of nuclear technology has to be addressed since this can be a major obstacle to the movement of isotopes and radiation technology into industry, if the key industrial decision makers are not convinced of the safety of the technology. Additionally, the wider issue of public acceptance has to be considered.

(b) Host Country's Strategies

Recognizing that human resource development is vital to the effective development of any technology, participating RCA Member States would participate in training activities organized at the regional level to train key personnel who would then form the core group of experts in the specific application of isotopes and radiation technology. National training activities supported by national and international experts would be implemented subsequently to widen the trained manpower base. The promotion of this technology to the target industries would be addressed through national seminars for top-level executives and decision makers in the various related industries. These seminars or workshops would not only create awareness in this target group but would also serve to establish linkages between the Nuclear Institutes and industry. To sustain the industrial technological development, participating RCA Member States would assist in process and product development and at the same time advise on regulatory provisions for the incorporation of the relevant international standards.

(c) Prior and Ongoing Assistance

1. Under the Articles of the RCA Agreement, Member States will make available the necessary scientific and technical facilities for implementation of activities under this project. They will make significant 'in-kind' contributions through the hosting of meetings, seminars and training courses as well as the provision of experts.
2. The Governments of Japan and Australia have indicated that they are considering extra-budgetary support to allow the full range of activities to be implemented (refer Annex 1 and 2).
3. Country programmes on the application of nuclear techniques in industry in participating RCA Member States are being supported by the IAEA through the Technical Co-operation Programme.

(d) Institutional Framework

The task of planning, co-ordination and implementation of this project is assigned to the IAEA through the office of the RCA Co-ordinator. The RCA Co-ordinator will be supported by various sections in the IAEA Technical Co-operation Department as well as the relevant technical officers from the IAEA's technical departments. At the country level, the co-ordination and implementation will be undertaken by the assigned government organizations responsible for the RCA programme which in most cases are the National Nuclear Research Institutes. Each country in turn will nominate an RCA/UNDP counterpart and co-ordinators for each area of technology to create networks that can assist in the efficient implementation of the activities and act as effective interfaces for information transfer.

SECTION B: PROJECT JUSTIFICATION

(a) Problem to be addressed; the present situation

The Asia Pacific Region is undergoing rapid economic expansion with several of the RCA Member States experiencing average annual growth rates over the past decade of eight to ten percent. Recognizing the need for technological development and advancement to meet this rapid growth in these RCA countries, the IAEA has implemented projects on the application of isotopes and radiation technology at the regional level supported country programmes.

Through the UNDP assisted projects RAS/79/061 and RAS/86/073, efforts were concentrated on developing the trained manpower base in these applications. These projects have resulted in the establishment of core groups of experts at the National Nuclear Research Institutes (NNRI) to assist the industry in tracer technology, non-destructive testing (NDT), radiation technology and nucleonic control systems (NCS). Although these technologies have been adopted to varying degrees by regional industries in the RCA Member States, some NNRI's are not yet self-sufficient for scientific backstopping of the technologies or for undertaking exploitation of the technology as a service function.

In January 1990, a mid-term review of project RAS/86/073 made recommendation that due emphasis should be given to:

- the need for assistance to small and medium-sized industries;
- the need to address environmental problems, and
- the need to improve transportation infrastructure.

It also noted that problems of public acceptance were inhibiting the spread of isotopes and radiation technology and that the subjects of radiation protection and safety should be integrated into the training programmes. There was strong support from RCA Member States on the conclusions of this review.

In December 1990, an expert advisory group meeting concerned with the future development of the project identified four major elements that should be supported:

- Public Health and Environment
- Industrial Production
- Industrial Quality Control
- Materials Research and Development

On the basis of these recommendations, a draft project framework was drawn up and submitted for discussion at the RCA Working Group Meeting held in Viet Nam in March 1991. The RCA Member States agreed on several criteria to assist in the development of the final PFF, namely:

- the programme should concentrate on high quality, in depth projects, with more efforts to be placed on training to assist in supporting and sustaining the technology once transferred;
- the programme should be the best investment of the available funds both in terms of getting the advantages and benefits of current technology into industry and associated areas as well as providing an investment in new skills needed for the future of the industries and associated enterprises; and
- the programme should have high quality technical management and have increased use of long-term technical experts stationed in the region.

In order to achieve sufficient impact from these proposals, it was recognized that co-financing by the traditional donor countries Australia and Japan would be essential. The modified project proposal was then accepted by the RCA Member States at the Meeting in Viet Nam and confirmed in subsequent correspondence. The project proposal was endorsed by the RCA General Conference Meeting in September 1991.

(b) Expected end of project situation

At the end of the project there will be a substantial increase in the knowledge and skills levels within the various RCA countries. The technologies transferred in previous activities will have been made more sustainable through their increased use in this project and the widening of the application base will assist not only with the development of the skills and confidence of the personnel but also in the development of increased links with industry and utilities.

Each participating Government will have in place an established national co-ordination network linking the end users of a specific technology with the national centres. This will facilitate technology and information transfer so that not only the identification and analysis of appropriate technologies can take place but also there will be opened up a valuable additional channel to assist in issues related to policy and regulations.

In those sectors covered by this programme, there will be a better appreciation of radiation safety and radiation protection at the technical level. For the non-technical and general public the provision of informed articles and seminars during the course of this work will provide the necessary balance of information to address the issue of public acceptance and provide a rational basis for assessing the benefits of the technology.

The regional harmonization of regulations and procedures will provide an effective environment for the encouragement of regional trade, entrepreneurial activities and increased TCDC activities. Specifically most participating Members States will have adopted the standards and guidelines based on international recommendations Qualifying and Certification of NDT personnel for Industrial Sterilization of Medical Products and Devices; and Maintenance and Operation of Radiation Facilities.

(c) Target Beneficiaries

The target beneficiaries in the participating countries will be the industries associated with natural resource - based production, industrial quality control and private as well as government agencies involved in environmental managements activities.

(d) Project strategy and implementation arrangement

1. The regional networking involving staff of the National Nuclear Research Institute as well as staff of specific industries is expected to yield benefits in the improvement of general scientific and technological backstopping and bringing about a great awareness of the need of industry and the capabilities of the NNRI.
2. The training and technology transfer resulting from this project will flow into the industrial sector and other related agencies. Through national seminars, they will be alerted about new technologies. The RCA structure has a well developed delivery programme that has been operating effectively for many years.

3. The project will be implemented directly by the International Atomic Energy Agency (IAEA) through the RCA Co-ordinator. As recommended at the Terminal Review of RAS/79/061 and RAS/86/073, a Chief Technical Officer stationed in the region will co-ordinate and supervise the activities and conduct missions in the appropriate area of technology expertise. Additional long-term experts also stationed in the region will assist in the smooth implementation of the various activities planned under their area of expertise and will assist in maintaining momentum and consistency of approach.
4. The project strategy and implementation arrangements chosen stem from the previous ten years experience with projects RAS/79/061 and RAS/86/073. Over this time the management has been developed and well tested to ensure effective delivery of the programme.

(e) Reason for assistance

Over the past twenty years RCA has established itself as one of the most successful inter-governmental co-operative ventures and Member States are very reluctant to dilute the regional spirit and character through the acceptance of field financial support from governments outside the region. Impartiality of funding sources is therefore a premium requirement and UNDP's multilateral neutrality would ensure the continuation of this successful arrangement. UNDP support is also needed to mobilize a level of resources beyond that realistically achievable through solely IAEA and traditional donors (Japan and Australia) contributions. A high level of donor cost sharing will be contingent on significant financial support from UNDP. This proposal has been constructed on the basis of significant cost sharing in addition to the UNDP funds and the estimated budget clearly demonstrates this.

SECTION C: DEVELOPMENT OBJECTIVE

The common development objective of all the RCA Member States participating in this project is to maximize the effective transfer of technology from developed countries so that they have self-sufficiency. An essential part of this transfer process is the establishment of the technology with the appropriate industries, utilities and other 'end users'. It is also essential for the technology to be implanted with competent national institutes to ensure that exploitation can be backstopped and sustained with trained and experienced technologists.

There are a large number of techniques using isotopes and radiation that are routinely used in developed countries and which could be beneficially transferred. These techniques can make significant contributions in line with the objectives of the UNDP Fifth Inter-country Programme for Asia and the Pacific in the areas of the environment and natural resource management, technology development and technical development among developing countries. These additional skills will strengthen the technological investments already made in these countries through, in most cases, the establishment of their national nuclear research centres over the past two to three decades and will build additional technological capacity into these structures.

SECTION D: IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

Immediate Objective

Upgrading the capabilities of key personnel in science and industry on the technology and techniques using isotopes and radiation suitable for addressing problems of environmentally sustainable development.

Success Criteria

The establishment of an indigenous capacity to sustain and develop the acquired technology and techniques.

Output 1.1

At least one key scientist or engineer from each participating Member State trained in the use of nucleonic control systems nuclear gauges and similar devices in industry and industrialist informed on the technology.

Activities for Output 1.1

- 1.1.1 Experts missions to assist with technical and with economic aspects of NCS technology.
- 1.1.2 Regional seminars on the application of NCS in specific industries - paper and sheet products.
- 1.1.3 National seminars for industrialists informed on the technology.
- 1.1.4 Regional workshop/demonstration on NCS in small and medium size paper industry.
- 1.1.5 Fellowship training in NCS at regional centres of excellence.
- 1.1.6 Meeting of National Co-ordinators to establish priorities and co-ordinate activities.

Output 1.2

At least one scientist from each participating Member State trained in the use of isotope techniques in process optimization and industrialist informed on the technology.

Activities for Output 1.2

- 1.2.1 Meetings of National Co-ordinators to establish priorities, co-ordinate activities and prepare implementation strategy for National programmes.
- 1.2.2 Regional training courses on plant optimization in the processing of natural resources using isotope technology.
- 1.2.3 Regional demonstrations on the practical use of isotopes industrial process control applied to natural resources.

- 1.2.4 Fellowship training on process control using tracers at regional centres of excellence.
- 1.2.5 Expert missions
- 1.2.6 National seminars to promote the adoption of the technology by industry.

Output 1.3

At least one person from each participating Member State trained on the use of tracer technology to study the dispersion of effluents in water and relevant agencies informed on the technology.

Activities for Output 1.3

- 1.3.1 Regional training courses on the use of tracers to study the dispersion and fate of aqueous effluents in surface waters.
- 1.3.2 Regional training courses in the use of tracers to study the dispersion, movement and fate of aqueous effluents in groundwaters.
- 1.3.3 Field demonstrations of dispersion studies being carried out in the region
- 1.3.4 Fellowship training at Regional centers of excellence
- 1.3.5 Expert missions assist in the planning preparation, execution and analysis of effluent studies.
- 1.3.6 National seminars to promote the technology to industry, environmental agencies and other related groups.
- 1.3.7 Meetings of National Co-ordinators to establish priorities and co-ordinate activities.

Output 1.4

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.

Activities for Output 1.4

- 1.4.1 Set up National Co-ordinator Network for Nuclear Analytical Techniques for environmental studies by establishment of national co-ordination committees
- 1.4.2 Regional Training Course on Nuclear Analytical Techniques for Environmental Studies.

- 1.4.3 Regional workshops on sample preparation techniques for trace analysis of environmentally significant materials in aqueous media and in aerosols and quality control in trace element analysis.
- 1.4.4 National seminars for analytical laboratories on quality control and nuclear analytical techniques.
- 1.4.5 Regional inter-comparison of standard materials
- 1.4.6 Experts assistance to laboratories
- 1.4.7 Fellowships to regional centers of excellence
- 1.4.8 Meetings of National Co-ordinators to establish priorities and co-ordinate activities.

Output 1.5

A core of trained personnel from each participating Member State able to introduce NDE technology for metallic materials into new industries or those industries where it is underutilised and also for non-metallic construction materials.

Activities for Output 1.5

- 1.5.1 Expert missions to identify the specific needs in the country
- 1.5.2 Meetings of National Co-ordinators to optimize regional and national efforts
- 1.5.3 Regional seminar and workshop on NDE for specific industry applications such as petrochemical, power generation (including nuclear, transportation, oil refineries and aviation).
- 1.5.4 Regional workshops to provide experience in the techniques of non-metallic materials for NDE technologists.
- 1.5.5 National seminars for specific national industries and on specific non-metallic materials.

Output 1.6

At least one people from each participating Member State trained on the use of radiation technology for the treatment of flue gases, sewage sludge and municipal waste water and technoeconomic benefit analyses for each country. Seminars on the technology the relevant authorities and industries.

Activities for Output 1.6

- 1.6.1 Regional training courses on the radiation process of sewage sludge and municipal waste water.

- 1.6.2 National management seminars on the radiation processing of sewage sludge and municipal waste water.
- 1.6.3 Expert assistance to prepare technoeconomic benefit of sewage sludge and municipal waste water processing using radiation technology.
- 1.6.4 Regional training courses on the radiation processing of flue gases.
- 1.6.5 National management seminars on the radiation processing of flue gases
- 1.6.6 Expert assistance to prepare technoeconomic benefit analysis of radiation processing of flue gases.

Output 1.7

At least one scientist from each participating Member State to be trained and key industrialists informed on advanced applications of radiation technology of importance to Regional industries.

Activities for Output 1.7

- 1.7.1 Regional training/demonstration courses on techno-economic feasibility studies of radiation processing in printing and packaging industry.
- 1.7.2 National training courses/workshops on techno-economic feasibility studies of radiation processing in printing and packaging industry.
- 1.7.3 Regional training courses on fundamental aspects of radiation technology
- 1.7.4 Expert missions
- 1.7.5 Meetings of National Co-ordinators to establish regional priorities and co-ordinate activities.
- 1.7.6 Regional seminars on advanced applications of radiation technology.
- 1.7.7 National seminars on advanced applications of radiation technology
- 1.7.8 Expert Advisory Group Meeting.
- 1.7.9 International symposium on radiation vulcanization of natural rubber latex (RVNRL)
- 1.7.10 National training course/workshops on RVNRL.
- 1.7.11 Fellowship training in advanced application of radiation technology.

Immediate Objective 2

Preparation for National Governments of recommendations on specific industrial applications utilizing isotope and radiation technology which will be harmonized on Regional basis and also with international standards where possible.

Success Criteria

The adoption of the recommendations by the responsible Government Agency.

Output 2.1

For each country a set of recommended national standards for industrial sterilization of medical products and devices that would be harmonized within the region as well as with other internationally accepted standards such as ISO.

Activities for Output 2.1

- 2.1.1 Establishment of National Co-ordinators network
- 2.1.2 Expert Group Meetings to review international and national standards
- 2.1.3 Regional training courses for regulators and Government Agencies responsible for reinforcement of national regulations.
- 2.1.4 Regional training courses for operators of industrial sterilization facilities used for medical products.
- 2.1.5 National training courses in each of the RCA countries for regulators and operators of industrial sterilization facilities.
- 2.1.6 National seminars to promote the use of the standards.

Output 2.2

Harmonized NDE standards in the region through Regional Model Qualifying Examinations Proficiency Testing Programmes and the regional production of standard test pieces.

Activities for Output 2.2

- 2.2.1 Regional seminar to instruct on NDE test piece utilization for training and qualification examination.
- 2.2.2 Through participation in the ISO technical committee on NDE test pieces to produce recommendations for the region.

- 2.2.3 Regional workshops to give training on the fabrication of test pieces and the validation of their performance.
- 2.2.4 An assessment of the proficiency of NDE persons trained and certified in accordance with national training and certification schemes.
- 2.2.5 The production of sample Level 2 examination papers for all 5 basic NDE methods
- 2.2.6 Pre examination revision supervision of examinations and marking of examination papers.
- 2.2.7 To hold meetings of the Regional Board of Examinations Review to assess and co-ordinate the regional activities.
- 2.2.8 To produce regional model Qualifying Examinations in each of the 5 main NDE methods for Level 3 personnel in 8 countries.
- 2.2.9 To produce regional Proficiency Testing Programmes for Level 2 ultrasonic and radiography personnel.

Output 2.3

Harmonized recommendations to assist and support the development and maintenance of high standards of operation of radiation facilities.

Activities for Output 2.3

- 2.3.1 To organize workshops and seminars on a regional and national basis to promote GMP and GRP.
- 2.3.2 To organize regional workshops on safe operation of industrial radiation facilities
- 2.3.3 To produce written guidelines and operating procedures for radiation facilities to assist operators and for national regulating authorities.

SECTION E: INPUTS

Participating Countries

The participating countries Bangladesh, China, India, Indonesia, Malaysia, Mongolia, Pakistan, Philippines, Republic of Korea, Sri Lanka, Singapore, Thailand and Viet Nam would provide 'in-kind' contributions through the hosting of regional training courses, seminars, workshops and meetings. In addition, some of these countries, in particular those with established facilities in the National Nuclear Research Institutes, would provide fellowship training and expert services either short-term expert missions or lecturers for national training activities.

The estimated costs of in-kind contributions by activity is given in Annex 3.

The Governments of participating RCA Member States will nominate National Counterparts and National Co-ordinators. They will liaise with the IAEA and the Project Staff who will be involved in the co-ordination of national and regional activities.

Donor Countries

Japan has indicated support for several activities in the fields of Nucleonic Control Systems, Non-Destructive Evaluation and Radiation Technology. The detailed structure of the assumed contribution from Japan is shown by activities in Annex 4. It has been estimated by the IAEA that for the period 1993 - 1997 the Japanese contribution could be US \$1,603,000, comprising the following funded activities:

21	Regional Training Courses and Workshops	US \$802,000
44	Japanese experts to lecture in National Training Courses, Seminars and Workshops	US \$153,000
4	National Co-ordinators' Meetings	US \$189,000
6	Expert Advisory Group Meeting and meetings associated with the Examination and Certification Scheme for Non-Destructive Evaluation Personnel	US \$235,000
1	International Symposium on Radiation Vulcanization of National Rubber Latex (RVNRL)	US \$ 80,000
25	Experts on short-term missions	US \$111,000
	Fellowships	US \$ 33,000
	Total	<u>US \$1,603,000</u>

The government of Australia through the Australian International Development Bureau (AIDAB) has proposed to fund an RCA project on 'The Applications of Isotopes and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine with budget of approximately A \$500,000 (US \$350,000) per year over three years from mid 1992 to mid - 1995. There are three components in this project, applications to industry, applications to nuclear medicine and application of radiation protection to the industrial use of isotopes and radiation. Two of the segments of this proposed project, namely Industry and Industrial Radiation Protection are closely interlinked to this project on "The Use of Isotopes and Radiation Technology to strengthen Technology and support Environmentally sustainable Development" as shown in the Australian project document (Annex 5). Within the industry segment, funds will be allocated for Regional Training Courses and expert missions to assist in the National Training Activities. The industrial Radiation Protection segment will support the industry segment and will involve the development and distribution of high quality training manuals for use in the region.

The funds which will be allocated for the Industry segment and part of the Industrial Radiation Protection segment, will be utilised for the following activities:

2	Regional Training Courses	US \$160,000
30	Expert Missions to assist in the National Training Activities	US \$102,000
	Equipment for National Training Activities	US \$ 50,000
9	Man-months short-term expert missions	US \$ 90,000
	Development of training manuals in radiation protection for industrial applications	US \$230,000
		<hr/>
	Total	<u>US \$632,000</u>

The detailed breakdown of the proposed allocation of funds to be made available by Australia is shown in Annex 6.

It is also planned to put proposals to the government of Australia for further support to this project to cover the remainder of the life of this project from mid 1995 to mid 1997. The budget for this additional support is estimated at US\$368,000. Bringing the total estimated Australian contribution to US\$1,000,000.

UNDP

It is proposed that UNDP provide a sum of US \$2,985,400 for this project to fund the following activities.

13	Regional Training Courses and Demonstrations	US \$ 805,000
113	National Training Courses, Seminars and Workshops	US \$ 604,800
1	Expert Advisory Group Meeting	US \$ 30,000
11	National Co-ordinators' Meetings	US \$ 320,000
24	Man-months of short-term expert missions	US \$ 240,000
54	Man-months long-term experts	US \$ 495,000
45	Man-months fellowship training	US \$ 150,000
3	National Counterparts/Tripartite Review meetings	US \$ 120,000
1	Mid-term Review	US \$ 80,000
	Expendible equipment and miscellaneous costs	US \$ 100,600
	Official travel	US \$ 40,000
	Total	<u>US \$2,985,400</u>

The detailed distribution of proposed UNDP funds is given in Annex 7.

Government of Malaysia

At the 1992 RCA Working Group Meeting in Tokyo 24 - 27 March 1992, the Malaysian delegation pledged US\$50,000 to support project activities, contingent on significant UNDP support. This was confirmed at the 1992 RCA General Conference Meeting held in Vienna 23 September 1992. The activities to be supported have not been identified.

Bridging Activities

In anticipation of UNDP's acceptance of this project for funding, a bridging programme of activities were undertaken during 1992 to maintain the momentum of work in this area of technology and enable the new initiatives to be implemented as rapidly as possible because of the major management infrastructures being already in place and tested. The details are listed in Annex 8.

It should be noted that, in addition to financial support from IAEA, Japan and Australia, there were contributions from the Governments of China and India who each funded one regional training course.

IAEA

As the Executing Agency of this project, the IAEA will carry out its task through the RCA Co-ordinator who will in turn be supported by in-house technical officers from the various Technical Departments and administrative staff from the Technical Co-operation Department.

In addition, funds will be allocated largely to support one long-term expert who will be the Chief Technical Officer stationed in the Region.

1993	15 Man-months	US \$183,150*
1994	13 Man-months	US \$150,400
1995	14 Man-months	US \$160,000**
1996	15 Man-months	US \$170,000**
1997	16 Man-months	US \$180,000**
Total		<u>US \$843,550</u>

** Estimated about 5% inflation per- year over base year 1993/94 and also provision is subject to IAEA Board's approval.

SECTION F: RISKS

<u>Potential Risk</u>	<u>Estimated Likelihood</u>
1. At the Outset of the project, none are foreseen	
2. During project implementation, problems in the economies of the participating countries could limit adoption of the technologies by industries and related agencies.	Low
A lack of resolve by participating governments to address pollution management could limit the applications of some of the techniques.	Low

SECTION G: PRIOR OBLIGATIONS AND PREREQUISITES

Prior Obligations

None.

Prerequisites

1. The National Governments of all the participating RCA Member States to the project are signatories to an inter-governmental Agreement. The provision of full counterpart support is covered in Article V (1) of the Agreement which states:

Each government participating in a co-operative project in accordance with Article IV (hereinafter referred to as "Participating Government") shall implement the portion of the co-operative project assigned to it in accordance with paragraph 3(b) of Article VI. In particular, each participating government, subject to its domestic laws and regulations, shall:

- make available the necessary scientific and technical facilities and personnel for the implementation of the co-operative project, and
 - take all reasonable and appropriate steps for the acceptance of scientists, engineers or technical experts designated by the other participating governments or by the Agency to work at designated installations, and for the assignment of scientists, engineers or technical experts to work at installations designated by the other participating governments for the purpose of implementing the co-operative project.
2. The National Governments are required to communicate to the UNDP their countries' intent to participate in the project.

SECTION H: PROJECT REVIEWS, REPORTING AND EVALUATION

- 1 (a) The project will be subject to tripartite review (joint review by representatives of RCA Member States, IAEA and UNDP) at least once every 12 months, the first such meeting to be held within the first 12 months of the start of full implementation. The tripartite review meetings will coincide with the National Counterparts Meetings. The National Project Coordinator and Chief Technical Officer designated by the IAEA shall prepare and submit to each tripartite review meeting a Project Performance Evaluation Report (PPER). Additional PPERs may be requested, if necessary, during the project.
- 1 (b) A project terminal report will be prepared for consideration at the terminal tripartite review meeting. It shall be prepared in draft sufficiently in advance to allow review and technical clearance by IAEA at least four months prior to the terminal tripartite review.

2. The project shall be subject to review in the middle of the implementation cycle which is about 24 months after the start of full implementation. It is proposed that this mid-term evaluation be conducted by visits to six of the participating countries following a meeting between the evaluators, all national counterparts and the long-term experts. However, the organization, terms of reference and timing will be decided after consultation between the parties to this project.

SECTION I: LEGAL CONTEXT

Not applicable.

SECTION J: BUDGETS

The total budget for this project is estimated to be US \$6,796,550 with the following breakdown of sources:

UNDP	US \$2,985,400
IAEA	US \$ 843,550
Government of Japan	US \$1,603,000
Government of Australia	US \$1,000,000
Government of Malaysia	US \$ 50,000
Total	<u>US \$6,481,950</u>

The requirements of UNDP funds for each year is shown in Annex 9.

It should be noted that Government of Australia has only indicated financial support for 3 years to mid - 1995, amounting to US\$632,000, the additional US\$368,000 for the 18 months to the end of 1997 has been assumed, without any donor commitment.

The allocation of funds according to the main categories of activities are as follows:

<u>Activity</u>	<u>Cost (US \$)</u>
Training (Regional, National, Symposium, Fellowship, Training Manuals)	3,672,800 (56.7%)
Experts	1,963,550 (30.3%)
Meetings (Expert Advisory Group, National Counterparts)	585,000 (9.0%)
Review/Evaluation	200,000 (3.1%)
Equipment	60,600 (0.9%)
Total	<u>6,481,950</u>

However taking into consideration the in-kind contribution of participating countries, the total budget would be higher by US\$1,903,800 bringing the total contribution to US\$8,385,750.

**PROJECT TITLE AND NUMBER. THE DIAGNOSIS OF HEPATITIS B INFECTION
BY RADIOIMMUNOASSAY. (RAS/6/018).**

Project Description. Begun in 1992, the project seeks to introduce and establish bulk reagent based radioimmunoassays (RIA) for a selected panel of Hepatitis B (HBV) markers. The approach adopted is initially to introduce the required methodology depending on complete sets of reagents obtained from a central source within the region and then develop the expertise whereby as many as possible of the RIA constituents would be locally made. The final objective is to develop an indigenous capability to conduct screening programmes for HBV at the cheapest possible cost, without recourse to expensive commercial RIA kits and minimum dependence on imported materials.

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

Project officer. R.D.Piyasena.

Major Achievements and Activities in 1992.

1. The methodology, as introduced at a regional training course in late 1991, was fully established and found acceptable to all laboratories.
2. Over 15,000 RIA tubes of reagents, and necessary equipment, have been distributed to 37 initial participant laboratories together with supplies of a commercial kit for purposes of comparison. In mid 1992, standardised quality control sera for all the markers concerned was also supplied.
3. Clinical studies are underway with most attention being directed towards recognised high risk groups, particularly pregnant subjects in the first trimester, neonates, and blood donors. Some countries have extended the studies to prostitutes, homosexuals, etc.

Planned Activities for 1993.

1. The main objective is to begin on the local production of RIA constituents for at least the commonest markers, HBS Ag and HBS Ab. Towards this,
 - 1.1. A regional training course on The Production of Primary Reagents for the RIA of HBV Markers will be held in April.
 - 1.2. The reagent supply scheme will be amended in accordance with the production capability created by 1.1 above.
2. The number of participant laboratories will be increased to at least 45, and the clinical studies extended.
3. A meeting of national co-ordinators will be held at which both methodological and clinical aspects of the project will be reviewed and future project directions identified.

Project Title and Number

Radiation sterilization of tissue grafts and tissue banking for safe clinical use in Asia and the Pacific countries (RCA) (RAS/7/003)

Participating Member States

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

Project Officer

R.N. Mukherjee, RILS

Project Works, Background and Attainments

Since the first phase of the project, successfully continued from 1987 to 1991, with progressive advancement in the participating RCA Member States of radiation processing technology for locally-procured and -sterilized tissue allografts (i.e. donor was a human cadaver) and xenografts (i.e. donor was a suitable primate animal species); followed by physico-chemical and mechanical testing in compliance with the possible fulfilment of their intended clinical/surgical roles for repair of damaged tissue-related disabilities; culmination was reached in a number of pioneering countries (e.g. China, India, Philippines, and Thailand) in terms of a sufficient quantity of multi-tissue production bones (i.e. cortical and cancellous, crushed and powdered, for cavity filling, following sterilization by ^{60}Co -gamma radiation); cartilage; ligaments; fascia; dura; chorion amnion for burn wound dressings; among others. Successfully attempted clinical/surgical uses of those sterilized tissue grafts on disabled patients revealed that radiation effects (25 kGy from a ^{60}Co -gamma source) on organic tissue components provided beneficial attributes:

- (a) suppression of antigenicity;
- (b) sterility with predictable and high sterility assurance level (SAL 10^{-6});
- (c) freedom from toxic residues and from temperature rise contributing to an effective tissue healing (repair) induction; among others.

Pioneering countries adopted processing protocols as were accessible from advanced tissue banks in Europe and North America and a great deal of heterogeneity was noticeable in both the protocols and the clinical qualities of the finished grafts. Tissue graft research was adopted respectively, in China, India, the Republic of Korea, and Thailand, whereby cell biology and molecular biology tools were applied as appropriate (i.e. histology, cytochemistry, and radiotracers metabolism) in the follow-up of implanted tissue grafts and the progression of the healing process to help correlate with the rigours of tissue processing steps. In contrast, some countries of Islamic religion in the RCA region confined attention to the radiation-sterilization processing of chorion amnion dressings for burn wound treatments (as it was not permissible for them to use human cadaveric tissues). They (e.g. Bangladesh, Indonesia, Malaysia, and Pakistan) as well made a good headstart and yielded large quantities of burn wound dressings to treat patients with burns and bed sores; and promoted the public perception of future utility and acceptance of multi-tissue grafts in reconstructive surgery.

Economic equivalence of such indigenously-procured and radiation-sterilized grafts as compared to their commercial resource counterparts were encouraging indices to favourably influence the decisions of national health regulators and administrators. This triggered the setting up of national tissue banking establishments (in Bangladesh, China, India, the Republic of Korea, the Philippines, and Thailand), and the formulation and/or initiation of tissue procurement legislation (i.e. Bangladesh, China, India, Sri Lanka, and Thailand).

Noticeable in the sequence of individual country advancement in the RCA region were:

- (a) Heterogeneity of technical protocol for processing of tissues with concomitant variability in products' clinical quality and follow-up of patients.
- (b) Lack of quality control (QC) and quality assessment (QA) approaches.
- (c) Duplication of efforts in tissue sterilization process development because co-ordination and expertise sharing between RCA Member States was sub-optimally utilized.

The remedy to such potentially detrimental quality-related tissue factors was adopted through:

- (a) Attempts at harmonization of tissue graft protocol for processing, handling and radiation sterilization.
- (b) Radiation research data applications pertaining to tissue-interactions with γ -energy photons and their regulation for dispensable damage control.
- (c) GMP and GRP criteria adherence in the quality control and quality assurance goals
- (d) Regionalization of the tissue banking of radiation-sterilized grafts for safe clinical use.

These objectives have been addressed to RCA Member States through the holding of a Project Formulation Meeting (PFM) in Manila, Philippines, in August 1992, and adoption of the work schedule for the subsequent five-year tenure (1993 to 1998) which will be enumerated in the planned activities for 1993.

Planned Activities for 1993

1. An Expert Advisory Group (EAG) is scheduled for February 1993 to formulate:

- (a) Action plans for implementation of distant learning of tissue banking in manpower training for radiation-sterilized grafts in RCA Member States.

- (b) Preparation of specified comprehensive, user-friendly training kit packages.
 - (c) Regional training courses in, respectively, Indonesia (August 1993), and Vietnam (December 1993).
 - (d) Documentation of code of practice for quality assurance and sterility quality control of radiation-sterilized tissue grafts for safe, effective clinical use (i.e. according to the ISO guidelines).
2. To widen the developmental scopes of RCA programme output through closer co-ordination with:
- (a) European Tissue Banking Meeting in Athens, Greece, in May 1993.
 - (b) American Tissue Banking Association Meeting in Boston, USA, in September 1993.
3. Integration for RCA regionalization of individual tissue banking "country projects" with IAEA technical co-operation support.

P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON RADIATION
STERILIZATION OF TISSUE GRAFTS WITH EMPHASIS ON
CLINICAL AND STERILITY QUALITY ASSURANCE CRITERIA
- Place: Tissue Bank, China Institute of Radiation
Protection (CIRP), Taiyuan, China
- Date: 1 - 12 September 1992
- Deadline for
nominations: 15 June 1992
- Organizers: The International Atomic Energy Agency in co-
operation with the Government of China through
the China Institute of Radiation Protection
- Language: English
- Participation: The training course is open to twenty suitably
qualified participants from developing RCA Member
States in the Asia and Pacific region as detailed
in the section below.
- Purpose of the
course: The course programme is aimed at generally
strengthening indigenous skills and capabilities
of the participants for the local manufacture of
a wide spectrum of tissue grafts (such as bone,
skin, membranes, sutures, among others) sterilized
by radiation. However, there is, a growing
recognition in the field of clinically implanted
tissue banking that reconstructive surgery patients
with tissue grafts often need certain specified
type(s) of tissue repair processes to be sustained
to achieve the desired clinical goal of regaining
health with both structural and functional
reconstitution of the host's damaged tissue(s).
Those qualities of clinical grafts are related to
the conserved structural/biochemical status of
the bio-organic constituents of the grafts (i.e.
bone morphogenic proteins (BMP); enzymatic infra-
structure; immunogenicity; fibrillar architecture
of collagenous matrix; among other). In molecular
biology the trend of research techniques involving
nuclear as well as conventional methods shows
promise for the upgrading of graft quality so as
to favourably impact on the clinical remedial roles.
It is, therefore, one of the objectives of this
training course to help and inform the participants
on those technical and scientific aspects of graft
protocols (for QC and QA) through lectures and
hands-on practicals, as appropriate.

Participants'
qualifications:

Candidates should have sufficient background knowledge and interest in the specific discipline involving tissue grafts and should have awareness of the health-care services role(s) of the tissue banking establishments. Surgeons of the different medical departments; histo-pathologists; medical technologists; tissue bank operators; radiation biologists and biochemists with active research on characterization and regulations of radiation effects on tissues; radiation microbiologists; radiation dosimetrists; will benefit from this course, in turn to help serve in the multi-disciplinary manpower infrastructure for the national tissue banking programmes for radiation-sterilized tissue grafts.

Nature of
the course:

The instructions in the course will be through specialist lectures on principles of the scientific fields involved; hand-on practicals on the radiation techniques and process regulations as far as feasible; demonstration exercises on processed tissue grafts and packaging; supply of relevant manuals, code of practice literature and standards and guideline documents from established tissue banks in North America, Europe and other regions.

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 June 1992. 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 full cost of the participants' air travel from their home countries to China and return. During their attendance at the course, participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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 course, and it is clearly understood that each Government, in nominating candidates, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

F I N A L L I S T

REGIONAL (RCA) TRAINING COURSE ON RADIATION STERILIZATION OF TISSUE
GRAFTS WITH EMPHASIS ON CLINICAL AND STERILITY QUALITY ASSURANCE
CRITERIA, TAIYUAN, CHINA, 1 - 12 SEPTEMBER 1992

C7-RAS-7.003-004

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Project title: **COMPUTERS IN Tc-99M IMAGING**
Project RAS/6/016

Project officer: G. Nair and Y. Xie, Nuclear Medicine Section

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

Project objectives:

The main objective of the project is to promote the computer applications in nuclear medicine in RCA developing Member States. The major activity of the project is to organize regional training courses on the use of computer in nuclear medicine. The purpose of the course is to provide participants with advance training and practical experience in the application of computer techniques for analysis of gamma camera data, which are most lacking and badly requested in developing countries.

Major activities in 1992:

According to the good results of the previous courses and the new requests, the Australian Government has put additional funds to run the third regional (RCA) training course on the use of computers in nuclear medicine, Sydney, 9 March - 17 April 1992. The course consisted of the three week formal course in the Royal Prince Alfred Hospital and the three week post-course attachments in departments of nuclear medicine in the Sydney region. After wider announcements and careful selection of applicants, 10 medical physicists from 9 RCA Member States and 6 IAEA fellows in the Royal Prince Alfred Hospital participated in the course. The training included coverage of basic aspects of computing in nuclear medicine with emphasis on clinical applications which illustrated the quantitative nature of data analysis. The course included 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 photo emission computed tomography (SPECT) was also be included. The Australian lecturers and course organizers put a lot of efforts to provide vendor-specific tutorials so that participants received practical training relevant to their own need during the three week post-course attachments in nuclear medicine departments in the Sydney region. After the six week period, individuals obtained background knowledge and practical experience which permit them to use computer more effectively but also to enable them to provide further training to other professionals in nuclear medicine at a local level.

Proposed activities in 1993 (or 1994):

After three times of organizing such course, it has been demonstrated that the course is very successful in view of the course objective, contents, special approaches with the post-course attachments, and its impacts on promotion of nuclear medicine in the region, etc. Therefore, there is big demand to organize the course again and even a request to upgrade the course to an interregional level.

Subject to extra-budgetary funds available, it is suggested to organize such course again in 1993 or in 1994 in order to meet the requirement of fast development in the field of nuclear medicine in the whole region.

P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON THE USE OF COMPUTERS IN NUCLEAR MEDICINE
- Place: Department of Nuclear Medicine, Royal Prince Alfred Hospital (RPAH); and Australian Nuclear Science and Technology Organisation (ANSTO); Sydney, Australia
- Date: 9 - 27 March 1992
- In addition a three weeks attachment in departments in nuclear medicine in the Sydney region will be organized for the participants.
- Deadline for nominations: 20 December 1991
- Organizers: The Government of Australia, through the Royal Prince Alfred Hospital and the Australian Nuclear Science and Technology Organisation, in co-operation with the International Atomic Energy Agency (IAEA), within the framework of the Regional Co-operative Agreement (RCA).
- Language: English
- Participation: The course will be open to 12 participants from RCA Member States in the Asia and the Pacific region. Participating countries are encouraged to submit more than one applicant to provide scope for IAEA final selection.
- 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.
- 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 computed 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.

Nature of the course:

The course will consist of didactic lectures combined with practical session 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 attachments:

An essential element of the training offered is the provision of a three week period attached to department of nuclear medicine in the Sydney region. Candidates will have the opportunity of 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 in duplicate on the standard IAEA nomination form 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, not later than 20 December 1991. 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 requested that every applicant must fill in carefully the attached questionnaire for IAEA Computing Course and attach it as part of the application document. This information is indispensable for the selection of the course candidates and for arrangement of the course contents, as well as for the study in the post-course attachments.

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 to 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. Brian Hutton
Department of Nuclear Medicine
Royal Prince Alfred Hospital
Missenden Road
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Telex: 71-10719917
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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 Australia will, out of its extra-budgetary contribution to RCA, pay the cost of the participants' roundtrip air travel from their home countries to Sydney and return, as well as a stipend sufficient to cover the cost of their accommodation, food 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 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.

FINAL LIST

REGIONAL (RCA) TRAINING COURSE ON THE USE OF COMPUTERS IN NUCLEAR
MEDICINE, SYDNEY, AUSTRALIA, 9 - 27 MARCH 1992 (+ THREE WEEKS
FOLLOW-UP)

C7-RAS-6.016-003

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Co-ordinated Research Programme (CRP):

1. **Project Title:** Evaluation of imaging procedures for the diagnosis of liver diseases - Phase II (E1.30.06).

Description: This CRP is aimed at evaluating nuclear imaging and ultrasound imaging in terms of their superiority in diagnosing liver diseases. The parameters of evaluation include sensitivity and specificity and the tool of evaluation is receiver operating characteristics (ROC) analysis. The data for analysis include interpretation of a large number of liver images from all participating scientists and countries.

Participating Member States: Austria, Bangladesh, China, India, Japan, Republic of Korea, Pakistan, Philippines, Singapore and Thailand.

Project Officer: G. Nair

Main activities and achievements in 1992:

More than hundred images of various types of liver diseases in both imaging modes (nuclear and ultrasound) had been collected from participants. Suitable ones were selected and distributed to all participants who returned them after interpretation. The results of interpretation have been analysed by Japanese experts.

The final results were to be presented in the final RCM in last quarter of 1992. But due to administrative reasons, the RCM is postponed to 1993 and it is scheduled to take place on 27-29 January 1993 in Delhi, India.

Time table for activities in 1993:

1. Publication of final results;
2. Formulation of plans to bring out an atlas of liver images from the materials obtained in this CRP.

Co-ordinated Research Programme (CRP):

Project Title and Number: **ON COMPUTER-ASSISTED PLANNING DOSIMETRY IN
RADIOTHERAPY OF CARCINOMA OF THE CERVIX IN ASIA
AND THE PACIFIC REGION (E3.30.08)**

Project Description: The project aimed at introducing the use of a personal computer-based treatment planning system (with appropriate software) into the practice of radiotherapy, especially in the developing countries where computerized treatment planning facilities are not available. The relatively cheaper cost of such a system will make it readily affordable to many radiotherapy departments with the potential for improving the speed, quality and accuracy of their treatment plans for radiotherapy. This will ultimately result in improved patient survival data.

Participating Member States: India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Russia.

Project Officer: F. Durosinmi-Etti

Major Activities and Achievements in 1992

1. Training Workshop for Medical Physicists involved in the CRP, Bombay, India, 1 to 5 June 1992.
2. Second RCM, Jakarta, Indonesia, 30 November to 2 December 1992.

Time-table for Planned Activities in 1993

1. Final RCM and project termination, December 1993.
2. Publication of TECDOC.

P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON COMPUTER-ASSISTED PLANNING AND DOSIMETRY FOR CARCINOMA OF THE CERVIX
- Place: Tata Memorial Hospital, Bombay, India*
- Date: 1 - 5 June 1992
- Deadline for nominations:
- Organizers: The International Atomic Energy Agency in co-operation with the Government of India through the Postgraduate Institute of Medical Education and Research
- Language: English
- Participation: The workshop is open to 9 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop: The purpose of the workshop is to enable the participants in the Coordinated Research Project (CRP) to effectively utilize the treatment planning system envisaged for the radiotherapy project on carcinoma of the cervix.
- Participants' qualifications: Candidates should be the medical physicists or technologists who are assisting the principal investigators of the Coordinated Research Project (CRP) on Computer-assisted Planning and Dosimetry in the Radiotherapy of Carcinoma of the Cervix, and are actually involved in the on-going research project.
- Programme of the workshop: The following subjects will be covered during the workshop:
- Treatment planning techniques (manual and computerized), dose calculations and prescription in carcinoma of the cervix.
 - Introduction to a PC based treatment planning system.
 - Dose/Volume specifications for reporting intra-cavity insertions (ICRU 38 recommendations).
 - Quality Control-role of the radiotherapist, physicist and technologist.
 - Quality control of the treatment planning system.
 - Patient's treatment records and cancer registration.
 - Radiobiological considerations in brachytherapy of cervix carcinoma.
 - Daily practical training and exercises in the use of the planning system for brachytherapy, external irradiation, and combination of both in the management of different stages of carcinoma of the cervix.

* The Workshop was originally planned at the Postgraduate Institute of Medical Education and Research, Chandigarh, India, 13-17 April 1992.

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 January 1992. 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 contribution to RCA, defray the costs of the participants' air travel from their home countries to India 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.

REGIONAL (RCA) WORKSHOP ON COMPUTER-ASSISTED PLANNING AND DOSIMETRY FOR CARCINOMA OF THE CERVIX, BOMBAY, INDIA, 1 - 5 JUNE 1992

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*) Observer at no cost to IAEA



Co-ordinated Research Programme (CRP):

Project title: Radioaerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries (E1.30.05)

Description: The original CRP was extended for one year to specifically examine the effect of atmospheric air pollution on the lung permeability function. The results of this lung function (half disappearance time of Technetium-99m DTPA from lungs) are to be correlated with the quality of air present in the area where the subjects live.

Participating Member States: Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines, Singapore and Thailand.

Project Officer: G. Nair

Major activities and achievements in 1992:

The analysis and discussion of the results of the study were to take place in the final RCM scheduled for the last quarter of 1992; but was postponed due to financial crisis. Publication of the lung atlas reached the final stages of its preparation. This atlas was based on the original CRP "Radioaerosol lung imaging in chronic obstructive pulmonary diseases".

Time table for planned activities in 1993:

1. Final RCM on 21-23 January 1993 in Bombay, India;
2. Release of the Atlas in June 1993.

Project title: NUCLEAR INSTRUMENTATION MAINTENANCE
Project RAS/4/008

Project officer: Y. Xie, Nuclear Medicine Section

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

Project objectives:

The main objective of the project is to strengthen the technical infrastructures of nuclear instrumentation maintenance and repair for supporting any other research and applications in the region. 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 integrate preventive maintenance with quality control for key nuclear instruments in order to ensure their optimum operation and as well as high availability factor. The project RAS/4/008 was planned to collaborated with CRP on "Care and Maintenance of Nuclear Medicine Equipment in Asia" from the beginning.

Major activities in 1992:

1. The second project formulation meeting was held in Sydney in February 1992. After 4 years' implementation, the project is still facing more challenges and requirements from RCA Member States due to its significance in strengthening the technical infrastructure, especially for the rapid development and wider applications of nuclear medicine in developing countries. The meeting made some new strategies and set up a detailed work plan for the coming 5 years.
2. The project partially contributed to the Consultant Meeting on Upgrading of Analogue Gamma Cameras with Standard PCs and Relevant Software, Vienna, in April 1992. The meeting defined the way and the protocols to realize this programme. It was decided that some RCA Member States will contribute to the system development, experiment, personnel training and its implementation on a big scale. The meeting explored a way to upgrade some old nuclear equipment with new technology, which could be significant for making full use of existing instruments and resources in developing countries.
3. The Regional Consultants' Workshop on Utilization and Further Modification of Computerized Management of Preventive Maintenance (CMPM) was held, Kuala Lumpur in September 1992. The workshop reviewed the practice of preventive maintenance in the region in the past 10 years and the utilization of the CMPM in some RCA Member States. It was decided to modify the CMPM according to the requirements of nuclear instrument maintenance and to develop preventive maintenance protocols for some key nuclear instruments.

4. The First Task Group Meeting on Regional End-User Unions of Nuclear Medicine Equipment was held during the 5th Asian and Oceania Congress of Nuclear Medicine and Biology, 25-30 October 1992, Jakarta. The meeting reviewed service performance of each major manufacturers and a round table meeting was organized with all their representatives to discuss how to establish regional end-users union and how to improve the service and personnel training. It was the first step for the project to promote a closer and more regular co-operation between manufacturers and relevant end-users of very sophisticated nuclear medicine equipment through the proposed regional end-user unions in terms of rapid repair, proper preventive maintenance, adequate stocking of spare parts, well planned personnel training and timely updating of soft ware, etc.
5. Two Advanced National Workshops on Quality Control and SPECT were held in Beijing and Shanghai in November 1992. Two expert carried out lecturing and instructing the practice which were well received by 50 participants from all over the country.
6. Some advanced phantoms and test instruments for the quality control of SPECT systems have been sent to selected nuclear medicine centers in the region for a trial period. Some text books like " Quality Assurance in Nuclear Medicine Imaging - hardware and software aspects " have been sent to each RCA Member States. The "Training and Maintenance Manual on Nuclear Medicine Instruments" has been reprinted and is going to be sent for training in the region.

Proposed activities in 1993:

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

1. Regional working group meeting on editing a procurement manual on selection of protection devices for nuclear instruments, 29 March - 9 April 1993, Bombay, India (subject to funds available).
2. Regional planning meeting on quality assurance in nuclear medicine, one week in September 1993, Seoul, Republic of Korea.
3. Regional workshop on troubleshooting and repair of gamma cameras, 30 August - 24 September 1993, Bombay, India.
4. Regional training course on data transfer and software phantoms, one week in November 1993, Bangkok, Thailand.

Proposed protocol for a new RCA project

**A Co-ordinated Research Programme on Evaluation of
radioactive iodine therapy for hyperthyroidism**

Background:

The high incidence of goiter and hyperthyroidism in Asia is a well-known clinical fact. Hyperthyroidism is a functional derangement of the thyroid, which, without therapy can cause severe emaciation, and decompensation of the heart. Symptomatic or otherwise, a variety of tests for thyroid morphology and function are usually available involving radioisotopic as well as non-radioisotopic techniques and modalities. For therapy, there are three main methods for hyperthyroidism. Out of them, iodine-131 therapy is the most effective and continues to be widely employed. Its efficacy and safety have been repeatedly shown in long term studies. It is available and affordable to most people in developing countries. However, despite the great number of thyroid cases in this region, choice of techniques and evaluation of results have not been standardized.

Different investigators in Asia have reported individually their peculiar observations in their own series of patients. Most notable are (1) smaller doses are required for control of hyperthyroidism, (2) low incidence of post-therapy hypothyroidism. To date, there has been no analytical study of different therapeutic techniques using iodine-131, nor prospective study to evaluate the efficacy and incidence of post-therapy hypothyroidism.

Objectives:

The objectives of this proposed co-ordinated research programme are as follows:

1. To prospectively obtain and analyze the Asia-wide statistics on remission rate and post-therapy hypothyroidism.
2. To determine the effects of ethnic and geographic factors on response to I-131 therapy.
3. To design uniform and common parameters to assess clinical improvement and post-therapy hypothyroidism.

Materials and methods:

Each participating agency/country will establish a co-ordinating center headed by a nuclear medicine specialist who will be responsible for the completion of this descriptive-analytical investigation.

Subjects:

All hyperthyroid patients with diffuse goiter, 25-65 years old, will be screened for possible inclusion. Complete history and physical examination findings are to be recorded as per designed work sheet, preferably with standard scoring. Scintigraphic thyroid weight estimation and if possible ultrasonic thyroid volume determination, and 24 hour thyroidal uptake of radioiodine and its effective half life in the gland are determined or measured prior to treatment.

Inclusion criteria are as follows:

1. Newly diagnosed hyperthyroid patients with diffuse goiter with no other serious organic disease;
2. Previously diagnosed patients on medication at least 2 weeks after cessation of any antithyroidal drug therapy.
3. Recurrent goiter after thyroidectomy.
4. Radioiodine uptake values > 60%.
5. Patients with written informed consent.

Excluded are patients with nodular goiter, malignancy, critically ill, pregnant patients as well as patients who get pregnant during the study period.

At least 50 patients definitely diagnosed to have hyperthyroidism and who fulfil the inclusion criteria shall be collected by each participating country.

Biochemical parameters:

All qualified patients will have baseline tests which include: T3, T4, TSH, by radioimmunoassay, 24 hour radioiodine uptake and scan and possibly determination of thyroid antibodies namely, anti-thyroglobulin, anti-microsome, thyroid stimulating (LATS) and blocking antibodies.

Genetic background assessment is strongly suggested, if feasible, by determination of human leucocyte antigen (HLA).

Treatment:

Single dose treatment shall be employed. Patients shall be divided in two groups. 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. With patients ascribed to either of the two groups as above, the dose of radioiodine to be administered may be calculated from the following formula.

$$\text{Dose of I-131 in mCi} = W \times D / 17 \times \text{EHL} \times \text{TUR}$$

W = estimated weight of the thyroid gland from scintigraphic or ultrasonic image

D = anticipated absorbed dose in rad

EHL = effective half life of I-131 (using a tracer dose) in the thyroid gland

TUR = 24 hour thyroidal uptake ratio.

Retreatment, if required, shall be given at least 12 months after initial dose.

Follow-up:

Clinical evaluation of patients will be done three months after treatment. Repeat testing of biochemical parameters will be done in the 6th month. Subsequent clinical and laboratory testing will be done every six months up to at least 36 months, and if possible for a longer period.

Evaluation of results:

Response to iodine-131 will be determined by thyroid function tests such as T3, T4 and TSH measurement. TRH stimulation test may be done in doubtful cases. All events will be recorded, specially hypothyroidism. Diagnosis of hypothyroidism shall be based on unequivocally low T3 and T4, and TSH elevation, together with overt clinical signs and symptoms. All tests shall be done by radioimmunoassay techniques as far as possible.

The beneficiaries of the CRP will be major public hospitals, especially endocrine clinics in developing countries.

Proposed workplan:

First year:

1. Screening and inclusion of required number of patients;
2. Performance of required RIA tests;
3. Administration of appropriate therapy according to low dose and high dose groups.

Second year:

1. Continuing screening and inclusion of required number of patients;
2. Closely supervised follow-up:
 - (a) Clinical evaluation recorded on follow-up forms
 - (b) RIA testing
3. Evaluation of immediate results.

Third year:

1. Supervised follow-up and RIA testing as in year 2;
2. Collection and collation of data;
3. Preparation of initial comprehensive report and recommendation.

Future:

1. Long-term follow-up:
 - (a) Clinical evaluation
 - (b) RIA testing
2. Preparation of concluding report and recommendation.

Budget:

Year 1: US\$65,000 (13 contracts at US\$5,000 each)

Year 2: US\$ 65,000 (13 contracts at US\$5,000 each)
 US\$ 35,000 (Research Co-ordination Meeting)
 US\$100,000

Year 3: US\$ 65,000 (13 contracts at 5,000 each)
 US\$ 35,000 (Research Co-ordination Meeting)
 US\$100,000

TOTAL **US\$265,000**

Project Title and Number: Asian Regional Co-operative Project on Food Irradiation with Emphasis on Process Control and Acceptance (RAS/5/020).

Project Description: The project aims at transferring the technology of food irradiation to industries through proper process control and acceptance by the consumers. The introduction of this technology will reduce the post-harvest storage loss and improve hygienic quality of foods and increase export potentials of participating countries.

Participating Member States: Australia, Bangladesh, People's Republic of China, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Viet Nam.

Project Officer: P. Loaharanu, M. Ahmed.

Major Activities and Achievements in 1992:

1. Research Co-ordination Meeting, Beijing, People's Republic of China, 21 - 25 September 1992.
2. Workshop on Process Control, Shanghai, People's Republic of China, 31 August - 11 September 1992.
3. Expert Missions to assist in formulating/up-dating Food Irradiation Regulations: Sri Lanka, 6 - 8 May, 1992; Viet Nam, 11 - 16 May, 1992; Pakistan, 19 - 23 May, 1992; Malaysia, 4 - 10 October, 1992; Philippines, 10 - 17 October, 1992.

Time-table for Planned Activities in 1993:

1. Final Research Co-ordination Meeting, Seoul, Republic of Korea, 20 - 24 September, 1993.
2. Project Evaluation Mission, 30 August - 19 September, 1993.
3. Workshop on Harmonization of Regulations and Acceptance of Irradiated Food, Lucas Heights, NSW, Australia, 15 - 26 November 1993.
4. Expert Mission on Process Control, Marketing Testing and Consumers' Acceptance.

P r o s p e c t u s

- Title: UNDP/IAEA/FAO REGIONAL (RCA) WORKSHOP ON FOOD IRRADIATION PROCESS CONTROL
- Place: Shanghai Irradiation Centre, Shanghai, China
- Date: 31 August - 11 September 1992
- Deadline for nominations: 31 May 1992
- Organizers: International Atomic Energy Agency, the United Nations Development Programme, and the Food and Agriculture Organization of the United Nations, in co-operation with the government of China through the Shanghai Irradiation Centre.
- Language: English
- Participation: The workshop is open to 12 participants from developing Member States participating in the UNDP Asian Regional (RCA) Project on Food Irradiation on Process Control and Acceptance, RAS/89/044.
- Purpose of the workshop: The purpose of the workshop is to train
- plant managers, technical supervisors and operators of the irradiation facility available for treating food on a practical scale;
 - food inspectors/control officials who are responsible for controlling food irradiation processing,
- on proper operation and process control and the procedure of inspection to ensure that the principles of the Codex Standard and Code of Practice and Good Manufacturing Practices have been followed in the irradiation facilities.
- Participants' qualifications: Candidates should be plant managers, technical supervisors and/or operators of commercial/demonstration irradiation facilities, and food inspectors/control officials of food inspection departments of the Government.
- Nature of the workshop: The trade in irradiated food is likely to increase as several developed and developing countries have accepted and applied irradiation as a method for food preservation and ensuring hygienic quality of food. The technology of food irradiation is being implemented for commercial purposes in the Asia and Pacific region as several countries have established and/or are establishing commercial/demonstration food irradiators. Therefore, there is a growing demand to train plant managers/operators

of irradiation facilities on the correct operation of irradiation facilities to achieve proper operational and process control and the food inspectors/control officials in the inspection procedures for these facilities. The workshop will train the participants on the correct operation and inspection of licensed facilities processing foods in accordance with the principles of the Codex Standard and Code of Practice and ICGFI Codes of good irradiation practices. The workshop will place emphasis on good manufacturing practices, quality evaluation of treated foods, commissioning of facility, dosimetry techniques, record keeping and safety precautions.

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 or the Ministry of Agriculture). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 May 1992. Nominations received after that date or applications send 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 defray the full cost of the participants' air travel from their home countries to Shanghai and return. During their attendance at the workshop the participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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.

F I N A L L I S T

UNDP/IAEA/FAO REGIONAL (RCA) WORKSHOP ON FOOD IRRADIATION PROCESS
CONTROL, SHANGHAI, CHINA, 31 AUGUST - 11 SEPTEMBER 1992

C7-RAS-5.020-006

LIST OF PARTICIPANTS

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C7-RAS-5.020-006

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Project Title and Number:

CRP ON THE USE OF ISOTOPES IN STUDIES TO IMPROVE YIELD AND N₂ FIXATION OF GRAIN LEGUMES WITH THE AIM OF INCREASING FOOD PRODUCTION IN SAVING N-FERTILIZER IN THE TROPICS AND SUB-TROPICS IN ASIA. (D1-40.04)

Project Description:

The objective of the project is to increase the nitrogen fixing ability and yield of important grain legumes grown in Asia. Grain legumes are consumed much in Asia, and serve as a principal dietary protein. The yields are however low and need to be increased. Unlike most other food crops for which increased yield requires large amounts of expensive fertilizers, grain legumes under proper management can supply (fix) their own nitrogen from the atmosphere. They do not therefore require nitrogen fertilizers. The project is aiming at increasing the yield of soybeans, chickpea, mungbeans, groundnuts and cowpeas in 9 countries in Asia.

Participating Member States:

Australia, Bangladesh, China, India, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand.

Project Officer: Seth K.A. Danso

Major Activities/Achievements in 1992:

1. Fourth RCM in Harbin, China, 13-17 July 1992
2. Visits of consultants to Bangladesh, China, Malaysia, Philippines and Sri Lanka

Time Table of Planned Activities in 1993:

1. RCM in Tamworth, Australia, August 30 to 4 September
2. Workshop in Australia, 7 to 17 September

A:RCA-MTG.
1993-01-29/SKAD/rf

TECHNICAL COOPERATION PROJECT PROPOSAL FOR ASIA/PACIFIC REGION

TITLE: Use of the Sterile Insect Technique to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies

PROBLEM: Tropical fruit flies are a major impediment to the production of fruits and vegetables in the Asia/Pacific Region. These pests lay their eggs beneath the skin of the fruit and the larvae develop within. Rot organisms enter the fruit through the holes made by the females during egg laying. Fruit from infested areas cannot be exported to lucrative markets in Australia, Japan, New Zealand and the United States unless the fruit has been given a special treatment to destroy the life stages of the pests. In addition enormous inputs of labour are needed to cope with the fruit flies by covering individual fruits with paper bags or by using cultural techniques. Vast quantities of insecticides are imported by most countries to help reduce the severity of the losses.

BACKGROUND: The sterile insect technique has been used to eradicate the New World screwworm from the United States, Mexico and Libya. Also this technique has been used to eradicate the melon fly, Bactrocera (Dacus) cucurbitae from Okinawa and the neighboring islands. The techniques was used to eradicate the Mediterranean fruit fly from southern Mexico, northern Guatemala, Florida and California, and western Australia.

Zones of fruit production that are certified to be free of fruit flies and from which fruit can be exported to sensitive countries, have been established in Chile, Brazil, Australia, Florida, and Mexico (State of Sonora). Efforts to have production zones certified by importing countries as being fly-free are being made by Israel and Spain.

Work is proceeding to develop the use of the sterile insect technique to eradicate various fruit fly species or to create certified fly-free zones in Algeria, Argentina, Brazil, China, Chile, Colombia, Costa Rica, Ecuador, Hawaii (four species), Libya, Mexico (Anastrepha sp.), Morocco, Pakistan, Thailand and Tunisia. Strong interest in initiating such programmes has been expressed by Bangladesh, Myanmar, Philippines and Suriname.

During the mid 1980s Asia/Pacific Region annual production of fruits and vegetables was 84 million tons and 208 million tons respectively. This represents only 26 percent of world fruit production and 50 percent of world vegetable production. Moreover the annual per capita production of fruit was only 27 kilogrammes as compared to 100 kilogrammes for the rest of the world. Further annual per capita vegetable consumption in the region is only 70 kilogrammes as compared to the recommended level of 125 kilogrammes.

Per capita production of fruits and vegetables (kilogrammes) in 1985 was as follows:

	Fruit	Vegetables
Australia.....	140.....	80.4
Bangladesh.....	14.....	12.7
China.....	29.....	93.2
India.....	26.....	60.0
Indonesia.....	26.....	15.1
Japan.....	43.....	126.7
Malaysia.....	58.....	30.3
Mongolia.....	3.....	210.0
Myanmar.....	29.....	52.0
Nepal.....	9.....	16.3
New Zealand.....	135.....	136.7
Pakistan.....	25.....	26.6
Philippines.....	134.....	39.5
Republic of Korea...	35.....	224.6
Sri Lanka.....	85.....	20.8
Thailand.....	83.....	58.5
Vietnam.....	59.....	52.7
Asia/Pacific Reg...	110.....	72.4

Clearly there is an urgent need to remove the major impediments (such a fruit flies) in the production of fruits and vegetables in most of the countries and for the Region as a whole.

OBJECTIVE: Facilitate the production of fruits and vegetables by developing the capacity to utilize the sterile insect technique in the establishment and maintenance of certified fruit fly-free zones and for the eradication of fruit flies from ecologically isolated areas.

APPROACH: The countries that should be included with the option of accepting funds are Bangladesh, China, Indonesia, Republic of Korea, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. In addition Australia, India, Japan and New Zealand should participate as Agreement Holders. Each country would work on one of the two pest species.

The work will progress through three phases as follows:

Phase I: Preparatory Work Phase.

1. In each participating country a) identify an ecologically isolated or semi-isolated area of 100-200 hectares infested with one or more species of tropical fruit flies, b) determine the economic importance of the pest(s) and the cost of control for the country and for the locality, c) document the external costs of coping with the pest, e.g. pesticide poisoning, insecticide resistance, destruction of natural enemies, etc., d) assemble information on the population dynamics of the pest(s), and e) identify a tentative strategy for coping with the pest, e.g. use of quarantine check points and post harvest treatments, use of bait sprays, field sanitation, destruction of non-commercial host plants, cultural measures, use of biological agents, and release of sexually sterile fruit flies.

Phase II: Capacity Building Phase.

Develop plans for the pest management system to be pilot tested, establish a programme of sampling fruit for larvae and adults with traps, initiate mass rearing, establish methods of handling and distributing irradiated flies, etc..

Phase III: Pilot Trial Phase.

Conduct a pilot trial of the entire system of pest population suppression in each country.

BENEFITS: When fully implemented this system will increase the regional production of fruit by at least 20 percent. Production of certain vegetables will be increased by a similar percentage. International trade in fruits and vegetables will be increased dramatically. Environmental pollution will be greatly reduced with the result that natural enemies of insects and pollinating insects will be much more abundant and effective. Instances of accidental poisoning of pesticide applicators and field workers will be reduced. The consumers in Asia will benefit from better nutrition and from the greater availability at lower cost of fruits and vegetables. Pesticide residues in these products will be reduced. The need for hard currency for the importation of insecticides will be reduced.

DURATION: 5 years

BUDGET: US \$200,000 per year for 5 years for total of US \$1,000,000.

	<u>Phase I</u>	<u>Phase II</u>		<u>Phase III</u>	
	Year 1	Year 2	Year 3	Year 4	Year 5
Meeting (plan or review)	\$40,000	-0-	-0-	40,000	-0-
Supplies and equipment	139,200	139,200	139,200	139,200	139,200
Technical backstopping	20,800	20,800	20,800	20,800	20,800
Training Course		40,000	40,000		
Final meeting					40,000
Total	US \$200,000	200,000	200,000	200,000	200,000

Phase I: This would last one year. A meeting would be held to plan and organize the project. The meeting would be attended by one person from each of twelve developing countries and four developed countries. The average cost per person would be \$2,500 (16 X \$2,500 = \$40,000). Further the twelve developing countries would each receive \$11,600 for supplies (12 X \$11,600 = \$139,200). Technical backstopping would be provided by the RCA Coordinator and the Technical Officer. In addition to attending the meeting they would assure that each country would receive the appropriate software to facilitate mass production of sterile insects and to handle the large quantities of field data.

Phase II would require two years. A Regional Training Course of one month duration would be conducted by combining \$40,000 from Year 2 with \$40,000 from Year 3 for a total of \$80,000.

Phase III would require two years, also. In Year 4, a meeting would be held to critically review the results of the field tests and to make appropriate adjustments in the plans for the final year. At the end of the final year a meeting would be held to analyse all data and to prepare a high quality priced publication.

TECHNICAL COOPERATION PROJECT PROPSAL FOR ASIA/PACIFIC REGION

TITLE: Amelioration of Environmental Pollution By of F-1 Sterility For Controlling Caterpillar Pest of Horticultural and Field Crops.

PROBLEM: Heavy losses in the production of vegetables and field crops are caused by various caterpillar species of the Order Lepidoptera. Multiple applications of insecticides are employed annually to control these pests. For example, the diamond-back moth causes major losses of crucifers (cabbage, cauliflower, Brussel sprouts, broccoli, radish, turnip, mustard, and rape). It causes up to 70 percent losses in cabbage production, and necessitates up to 24 applications of insecticides per year in some areas. Similarly the pink bollworm is the major pest of cotton. It feeds on the fruit (bolls), and allows the entry of rot organisms. Some of the latter produce mycotoxins. When cotton seed meal is fed to animals for milk production, mycotoxins and insecticide residues are secreted into the milk.

Heavy insecticide useage results in the poisoning of some of the applicators and field workers, high residue levels on the vegetables and in cotton seed oil, and severe environmental pollution. This pollution decimates populations of beneficial insects that normally keep other pest species in check. Finally these pests contribute to dificulties in international trade in that the insecticides must be imported, but high insecticide residues on and in food products impede export of valuable vegetables and fruits.

BACKGROUND: The F-1 or inherited sterility technique is similar in many ways to the sterile insect technique. In both cases insects are mass reared and irradiated with ganmma rays.

The sterile insect technique has been used to eradicate the screwworm from the United States, Mexico and Libya. Also the sterile insect technique has been used very effectively against fruit flies. It was used to eradicate the melon fly from Okinawa and neighboring islands and the Mediterranean fruit fly from southern Mexico, Florida and California.

F-1 sterility is the method of choice against caterpillars. Lepidopterous insects are unusual in that very high doses of radiation are required to induce complete sexual sterility. Thus, at the relatively low rates of 100 - 150 Gy, the irradiated moths are only partially sterilized, but the F-1 generation may be fully sterilized. Moreover moths treated at these lower doses are much more competitive sexually than those treated at fully sterilizing doses. Also the F-1 generation can be reared in the field. This is an advantage because the rearing of lepidoptera tends to be costly. Thus F-1 sterility has a great potential for use in area-wide schemes to combat these formidable herbivores.

This approach has been used in the United States to eradicate incipient infestations of the gypsy moth. Also sterility has been used for two decades to protect more than 0.5 million hectares of cotton in California from the pink bollworm, which migrates into the cotton growing region from the southern desert.

The Joint FAO/IAEA Division has a just completed one Coordinated Research Programme on F-1 sterility involving the diamond-back moth and the pink bollworm. Scientists from the following Asian countries participated: China, Indonesia, Malaysia, and Pakistan. Another Interregional Coordinated Research Programme is being organized. Also the International Atomic Energy Agency has a multidisciplinary Technical Cooperation Project in Malaysia (MAL/5/020) which includes a programme with the Malaysian Agricultural Research and Development Institute on control of the diamond-back moth with F-1 sterility. A similar small project on Spodoptera has been completed in Indonesia. Thus there are scientists in the region who have some competence in this field.

OBJECTIVE: Ameliorate environment degradation from insecticides by developing and implementing an economically advantageous system of controlling the diamond back moth and the pink bollworm based largely on F-1 sterility use of biological control agents and other non-chemical methods.

APPROACH: The countries that should be included with the option of accepting funds are Bangladesh, China, Indonesia, Republic of Korea, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. In addition Australia, India, Japan and New Zealand should participate as Agreement Holders. Each country would work on one of the two pest species.

The work will progress through three phases as follows:

Phase I: Preparatory Work Phase.

1. In each participating country a) identify an ecologically isolated or semi-isolated area of 100-200 hectares infested with one of these pests, b) determine the economic importance of the pest and the cost of its control for the country and for the locality, c) document the external costs of coping with the pest, e.g. pesticide poisoning, insecticide resistance, destruction of natural enemies, etc., d) assemble information on the population dynamics of the pests, and e) identify parasites predators or pathogens that may be employed to reduce the density of the pest population sufficiently so that a high ratio of released irradiated moths to wild moths may be established.

Phase II: Capacity Building Phase.

Develop plans for the pest management system to be pilot tested, initiate mass rearing and establish methods of handling and distributing irradiated moths as well as for one or two biological control agents.

Phase III: Pilot Trial Phase.

Conduct a pilot trial of the entire system of pest population suppression in each country.

BENEFITS: When substantially implemented this sytem of crop protection would:

- a. facilitate more reliable crop production in that the development of resistance to insecticides would be avoided.
- b. reduce the residues of insecticides on and in vegetables and other plant products. This will remove the barriers to trade of vegetables within the region.
- c. place pest management on and environmentally sound basis.
- d. reduce the losses caused by pests and the cost of production.

DURATION: 5 years

BUDGET: US \$200,000 per year for 5 years for total of US \$1,000,000.

	<u>Phase I</u>	<u>Phase II</u>		<u>Phase III</u>	
	Year 1	Year 2	Year 3	Year 4	Year 5
Meeting (plan or review)	\$40,000	-0-	-0-	40,000	-0-
Supplies and equipment	139,200	139,200	139,200	139,200	139,200
Technical backstopping	20,800	20,800	20,800	20,800	20,800
Training Course		40,000	40,000		
Final meeting					40,000
Total	US \$200,000	200,000	200,000	200,000	200,000

Phase I: This would last one years. A meeting would be held to plan and organize the project. The meeting would be attended by one person from each of twelve developing countries and four developed countries. The average cost per person would be \$2,500 (16 X \$2,500 = \$40,000). Further the twelve developing countries would each receive \$11,600 for supplies (12 X \$11,600 = \$139,200). Technical backstopping would be provided by the RCA Coordinator and the Technical Officer. In addition to attending the meeting they would assure that each country would receive the appropriate software to facilitate mass production of sterile insects and to handle the large quantities of field data.

Phase II would require two years. A Regional Training Course of one month duration would be conducted by combining \$40,000 from Year 2 with \$40,000 from Year 3 for a total of \$80,000.

Phase III would require two years, also. In Year 4, a meeting would be held to critically review the results of the field tests and to make appropriate adjustments in the plans for the final year. At the end of the final year a meeting would be held to analyse all data and to prepare a high quality priced publication.

27 April, 1992

TITLE

Establishment of a regional rinderpest sero-monitoring network in Asia in support of the South Asia Rinderpest Eradication Campaign (SAREC).

OBJECTIVES

To establish and quality assure an immunoassay-based capability to serologically monitor rinderpest vaccination campaigns in countries infected with rinderpest and in those free of rinderpest to provide evidence for international declarations of freedom as part of the programme of regional eradication of this disease and its causative virus.

BACKGROUND

Rinderpest (cattle plague) is the world's most devastating cattle disease. Although it has never occurred in the Americas and Australasia and was eliminated from Europe at the beginning of the century, it still continues to cause enormous economic losses to livestock producers in Africa, Arabia and Asia. These losses are attributable not just to the animals that die, but to the costs associated with annual vaccination programmes, preventive measures and lost export markets in countries free of rinderpest.

From Table I it can be seen that at present this disease costs the Asian region around 3.2 billion US\$ per year through control programmes (vaccination campaigns, movement controls etc.), through direct losses from infected animals and through loss of export markets. Successful eradication would result in these losses being eliminated and considerable revenue would be generated in the livestock industries of each country through increased export markets and the reduced imports of livestock products.

In 1986, Africa embarked on a regional eradication programme, the Pan African Rinderpest Campaign (PARC) with the assistance of the EEC. Central to this programme has been the mass vaccination of cattle in the region to eliminate the disease, followed by a period of intense surveillance to ensure that the causative virus has been eliminated and that no pockets of virus activity remain. At the outset of the programme 14 African countries were infected, today only two (Sudan and Ethiopia) still have rinderpest. West Africa, now for the first time ever clear of rinderpest, is embarking on the process of obtaining international status of freedom from rinderpest.

Table I: South Asia Rinderpest Eradication Campaign (SAREC); Estimated losses per year.

Country	IAEA member state	Rinderpest	Cattle numbers (millions)	Vaccinat. carried out	Cost of Vaccination (us\$ x 10 ³)	Overall control costs *
India	yes	yes	198	yes	792	2.2 bil.
Pakistan	yes	yes	17.7	yes	70.8	560 mil.
Afghanistan	yes	yes	1.6	yes	6.4	120 mil.
Bangladesh	yes	yes	23	yes	92	100 mil.
Nepal	no	?	6.3	yes	25.2	50 mil.
Butan	no	yes	0.4	yes	1.6	10 mil.
China	yes	no	81.4	no	?	?
Myanmar	yes	no	9.3	no	-	10 mil.
Thailand	yes	no	6.0	no	-	10 mil.
Indonesia	yes	no	10.3	no	-	?
Philippines	yes	no	1.6	no	-	?
Mongolia	yes	yes	11.2	yes	11.2	150 mil.
South Korea	yes	no	2.1	no	-	?
North Korea	no	no	1.3	no	-	?
Totals			362 mil.		998.2	3.17 us\$ (Billion)

* These include direct losses due to animal death and loss of productivity; control programmes (vaccination etc.); movement restrictions and indirect losses due to loss of export markets.

Similar programmes are now being undertaken in Arabia (WAREC, West Asian Rinderpest Eradication programme) and Asia (SAREC, South Asia Rinderpest Eradication programme) under the overall umbrella of the global rinderpest eradication programme (GREC), coordinated by FAO. Without doubt this is the largest ever livestock disease control programme, estimated to cost around \$ 1 billion and the socio-economic benefits although difficult to quantify, will be enormous.

Crucial to both the vaccination and surveillance phases of this global programme is the serological examination of cattle for antibodies to rinderpest - during the vaccination phase as evidence of successful vaccination, and during the surveillance phase for the detection of evidence of remaining pockets of virus activity.

Under PARC the FAO/IAEA ELISA-based test for rinderpest sero-monitoring was successfully introduced to over 21 national veterinary laboratories and some 2 million cattle sera have been screened so far. By adopting a network approach, fully validated and standardised procedures have been used throughout the region and an external quality assurance programme has ensured that the results being reported are correct.

The FAO/IAEA test has been accepted by the world's veterinary regulatory body, the OIE (Office International Des Epizooties), as the official serological procedure to be used as part of the process of OIE declarations of freedom from rinderpest. This five year process, starting with a cessation of rinderpest vaccination is the corner-stone of the eradication programme, and sero-surveillance is the most vital aspect.

In the Asian region two distinct classes of countries exist - those which are vaccinating because rinderpest exists in the country or in a neighbouring country, and those which are not vaccinating although they have not been officially declared free of the disease by OIE (see Table 1). In both cases countries in the region need to sero-monitor - either to evaluate their vaccination programmes or to meet the regulatory requirements of evidence of freedom from disease and the virus. Central to either process is the use of the FAO/IAEA ELISA-based test. Many of the more advanced

countries in the region already have the necessary equipment and overall expertise to run the assays. These countries will therefore only need initial training in the FAO/IAEA competitive ELISA kit, a routine supply of the kits and to participate in the FAO/IAEA External Quality Assurance Programme which will provide evidence that the results they are achieving are indeed correct.

Countries currently vaccinating against rinderpest (and in nearly all cases these are the less developed ones) will need the necessary equipment (approximately \$15,000 per laboratory), initial training in the use of the kit and routine technical backstopping to ensure the continued correct use of the kit. They will need epidemiological support in designing acceptable sampling frames. They will also need to participate in the External Quality Assurance Programme. It is anticipated that these countries will all cease vaccination with 3 - 5 years and will thus also be able to achieve international certification of freedom from rinderpest.

NATIONAL INPUTS

Countries participating in SAREC will have a requirement to provide suitable laboratory facilities to carry out serological and disease surveillance. This will require not only the provision of suitable laboratory buildings and the infrastructure for them to operate effectively, but the necessary trained man-power and transport to ensure the collection and testing of samples. In the case of PARC, in nearly all participating countries EEC-funded national projects have ensured sufficient resources to provide for the field collection of sera and much of the required laboratory equipment. The EEC has allocated considerable resources for a similar programme in Asia and it is anticipated that a similar approach will operate.

AGENCY INPUTS

The role of the Agency will primarily be one of technology transfer and coordination, the provision of suitable training and technical backstopping and the provision of the ELISA kits linked with an External Quality Assurance Programme to ensure the validity of the results being obtained.

LONG-TERM IMPACT

The successful global eradication of rinderpest will have enormous benefits to livestock producers in the world's poorest countries - since these are the very countries which still have rinderpest today! Experience in Africa has demonstrated that in achieving eradication it is necessary to considerably strengthen veterinary services and this will have a significant long-term beneficial effect in the control of other major diseases affecting livestock in individual countries. Finally, the ELISA system, fully sustainable in the long-term, is applicable to nearly all animal disease control programmes hence the equipment and technology transferred through this programme will have applications for many years to come.

Vital to eradication is sero-surveillance, without which it is impossible to ensure that the largest and most costly animal disease control programme can be seen to have succeeded in Asia.

COSTS

Year	Experts		Equipment	Training	Total
	Months	CC \$	CC \$	CC \$	CC \$
1	12	124,000	80,000	40,000	244,000
2	12	129,000	40,000	-	169,000
3	12	134,000	30,000	40,000	204,000
4	12	139,000	30,000	-	169,000
5	12	144,000	30,000	-	174,000

Grand Total: US\$ 960,000



Proposal for a new Coordinated Research Programme related to the RCA activity

Title: BANANA IMPROVEMENT IN ASIA: INTEGRATION OF MUTATION AND RELATED TECHNOLOGIES INTO CONVENTIONAL BREEDING.

Scientific Background:

Banana, plantain or cooking banana (*Musa* spp.) are important crops for subsistence diet of the poor millions and as export commodities for the developing countries in Asia. Nearly all the banana cultivars have originated as natural variants. Most banana species are sterile, and do not produce seed. As banana has become an obligatory vegetatively propagated plant, its breeding - based on conventional methods - has had extremely limited success. Radiation induced mutagenesis, in combination with the emerging technologies of *in vitro* culture of established cultivars and hybrids (plantain x banana) together with *in vitro* induced polyploids, offer the possibility to create new germplasm for improved yield, quality or pest and disease resistance.

A previous interregional CRP supported the development of technology on banana *in vitro* culture for its irradiation and multiplication of true-to-type clones. As a result, the problems of euclonal propagation are nearing a solution. It will now be possible to use these technologies to improve productivity of local cultivars which were limited due to tallness, late maturity and susceptibility to diseases such as foot rot caused by *Fusarium*. Induced mutations for such characters can help to improve the specific clones.

Objectives:

The main objectives of this project are:

1. to integrate radiation induced mutations and *in vitro* culture into the conventional breeding of banana by generating desired type of variation,
2. to develop molecular probes for RFLP and DNA finger-printing to facilitate mutation breeding,
3. to develop systems for early disease detection in the Asian *Musa* spp. cultivars,
4. to use PCR (polymerase chain reaction), RAPD (random amplified polymorphic DNA) for marking mutants and parental clones to build the genetic basis of banana breeding.

Work Plan and Implementation:

The project would be implemented over a duration of five years:

- 1: *In-vitro* cultures of selected clones, cultivars and hybrids, important in each ecological zone, shall be established by the participating institutions. This material shall be irradiated with gamma rays, and treated with other mutagens, if required. Training and radiation facility shall be provided, if required, by the IAEA Laboratories, Seibersdorf.
- 2: The irradiated cultures shall be *in vitro* multiplied through M₁V₃/V₄ progenies.
- 3 & 4: *In vitro* propagated plants shall be weaned and field planted along with the parental cultivars as controls in replicated trials and observed for specific characters such as dwarf height, increased yield, early fruiting, disease resistance, pest resistance, depending upon the agro-climatic zones. The selected mutants and the parental clones shall be subjected to DNA finger-printing, RFLP, PCR, RAPD, dot blot analysis to establish the molecular basis of mutation, identity and markings.
- 5: Selected mutants shall be multiplied *in vitro*, characterized morphologically and evaluated in multi-location trials.

Participating Countries:

Australia
Bangladesh
China
India
Indonesia
Japan
Malaysia
Pakistan
Philippines
Sri Lanka
Thailand
Viet Nam
FAO/IAEA Laboratories

Budget:

Anticipated budget:

- Research Contracts (US\$ 5000/participant/year)	US\$	250 000
- Supporting laboratory: (preparing plant material, irradiation, develop methodology, shipping etc.)		225 000
- Technical contract: donor country institute (to provide plant material, DNA probes)		110 000
- Research Coordination Meetings (3x)		90 000
Total		675 000

**Project Title and Number: RESEARCH REACTOR
UTILISATION (RAS/4/011)**

Project Description: Presently there are 32 operative research reactors in the Member States of the region while one is under construction, 2 are planned and 4 are shutdown. Thus it has the largest concentration of research reactors in a developing region. Quite a few of these reactors are more than 25 years old but there is a continuing demand for their operation and use. The aim of this project is to assist the participating Member States in improving reactor utilisation, operational safety, and development of manpower. It also aims at improving co-operation among the participating countries.

Participating Member States: Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Pakistan, Philippines, Thailand and Vietnam.

Project Officer: K. M. Akhtar.

Major Activities in 1992:

Training Courses

1. Training course on Measurement of Basic Parameters of Research Reactors, Serpong, Indonesia.
2. Regional Workshop on Neutron Transmutation Doping Technology, Beijing, China.
3. Training course on Safety Documentation of Research Reactors, Dhaka, Bangladesh.
4. Training course on Materials Characterisation Using Low and Medium Flux Research Reactors, Beijing, China.

Co-ordinated Research Programme (CRP)

Co-ordinated research programme to enhance application of personal computers for research reactor operation and management has continued. During 1992, there were 8 active research contracts. This programme will result in tested computer codes for use in the region as well for other similar reactors.

Activities Planned for 1993: Following activities are planned for 1993;

1. Programme formulation meeting in May, 1993.
2. Research co-ordination meeting for CRP in May, 1993.
3. Training course on Calculation and Measurement of Neutron Flux Spectrum for Research Reactors in September, 1993.
4. Extension of the CRP.

P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON MEASUREMENT OF BASIC PARAMETERS OF RESEARCH REACTORS
- Place: Multipurpose Reactor Centre, Serpong (Jakarta), Indonesia
- Date: 3 - 21 August 1992
- Deadline for nominations: 30 April 1992
- Organizers: International Atomic Energy Agency in co-operation with the Government of Indonesia through the National Atomic Energy Agency
- Language: English
- Participation: The course is open to 10 participants from developing RCA Member States in the Asia and Pacific region. Preference will be given to candidates from countries having operative research reactors or research reactors under construction.
- Purpose of the course: The purpose of the course is to provide theoretical knowledge and practical training to the participants on the techniques and methodology of measuring basic parameters of research reactors to complement calculations and to support efficient operation.
- Participants' qualifications: The course is designed for scientists and engineers having a basic knowledge of theoretical and experimental reactor physics, preferably familiar with reactor operation.
- Nature of the course: The course will consist of lectures and experimental measurements. The following subjects will be covered during the course:
- determination of criticality
 - calibration of control rods
 - measurement of reactivity coefficients
 - reflector savings
 - xenon and samarium poisoning
 - fuel burnup
 - fuel coefficient
 - power calibration by heat balance
 - neutron flux and spectrum
 - water treatment parameters
 - noise analysis

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 30 April 1992. 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 full cost of the participants' air travel from their home countries to Jakarta and return. During their attendance at the course participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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 course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

FINAL LIST

REGIONAL (RCA) TRAINING COURSE ON MEASUREMENT OF BASIC PARAMETERS
OF RESEARCH REACTORS, SERPONG (JAKARTA), INDONESIA, 3 - 21 AUGUST
1992

C7-RAS-4.011-004

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P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON SAFETY DOCUMENTATION FOR RESEARCH REACTORS
- Place: Savar, Dhaka, Bangladesh
- Date: 12 - 23 October 1992
- Deadline for nominations: 30 June 1992
- Organizers: International Atomic Energy Agency in co-operation with the Government of Bangladesh through the Bangladesh Atomic Energy Commission
- Language: English
- Participation: The course is open to 12 participants from developing RCA Member States in the Asia and Pacific region. Preference will be given to candidates from countries having operative research reactors or research reactors under construction.
- Purpose of the course: The purpose of the course is to acquaint research reactor staff responsible for the operation and safety of the reactor with the requirements of safety documentation so as to improve the availability of up-to-date essential information concerning design, construction, operation, maintenance and the environment
- Participants' qualifications: The course is intended for scientists and engineers who are responsible for the operation of a research reactor, or belong to the regulatory body responsible for these reactors.
- Nature of the course: The course will consist of lectures and instructions regarding preparation and updating records of facilities with specific examples where possible. The following subjects will be covered during the course:
- design and construction dates
 - relevant commissioning records
 - operating instructions including routine and non-routine activities
 - maintenance, modifications and testing
 - in-service inspections
 - safety analysis
 - radioactive waste storage, release and environmental monitoring
 - staff training and responsibilities
 - quality assurance
 - reviews by the regulatory body.

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 190, A-1400 Vienna, Austria, not later than 30 June 1992. 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
certificates:

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 full cost of the participants' air travel from their home countries to Dhaka and return. During their attendance at the course participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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 course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

REGIONAL (RCA) TRAINING COURSE ON SAFETY DOCUMENTATION OF RESEARCH
REACTORS, DHAKA, BANGLADESH, 12 - 22 OCTOBER 1992

C7-RAS-4.011-005

LIST OF PARTICIPANTS

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REGIONAL (RCA) TRAINING COURSE ON SAFETY DOCUMENTATION OF RESEARCH
REACTORS, DHAKA, BANGLADESH, 12 - 22 OCTOBER 1992

C7-RAS-4.011-005

LIST OF OBSERVERS *)

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*) Observers, at no cost to the IAEA

P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON MATERIALS CHARACTERIZATION USING LOW AND MEDIUM NEUTRON FLUX REACTORS
- Place: China Institute of Atomic Energy, Beijing, China
- Date: 26 October - 13 November 1992
- Deadline for nominations: 15 August 1992
- Organizers: The International Atomic Energy Agency in co-operation with the Government of China through the China Institute of Atomic Energy
- 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 theoretical knowledge and practical training on the techniques and methodology of using neutron techniques for material investigations and development. The objectives are to show how such techniques can supplement other physical and chemical measurements and to demonstrate experimental methods and data analysis.
- Participants' qualifications: Candidates should be materials scientists or technologists. It is not necessary for the candidates to have previous experience with neutron techniques, however, a basic knowledge of reactor physics and supplementary methods such as X ray diffraction would be advantageous.
- Nature of the course: The course will be held at the site of a heavy water medium flux reactors having six horizontal beam tubes. Instruments for powder and single crystal diffraction and small angle scattering, as well as for time of flight and 3-axis inelastic scattering are available.
- The course will consist of lectures on small angle scattering and diffraction methods, techniques which have a large number of applications to materials.
- The lectures will be accompanied by practical demonstrations using the small angle scattering and powder diffraction machines. Special emphasis will be put on experimental data analysis in terms of material parameters.

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 August 1992. 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 full cost of the participants air travel from their home countries to Beijing and return. During their attendance at the course participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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 course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

REGIONAL (RCA) TRAINING COURSE ON MATERIALS CHARACTERIZATION USING
LOW AND MEDIUM NEUTRON FLUX REACTORS, BEIJING, CHINA, 26 OCTOBER -
13 NOVEMBER 1992

C7-RAS-4.011-006

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P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON NEUTRON TRANSMUTATION DOPING TECHNOLOGY
- Place: China Institute of Atomic Energy (CIAE), Beijing, China
- Date: 5 - 10 October 1992
- Deadline for nominations: 31 May 1992
- Organizers: The Government of China through the China Institute of Atomic Energy, in co-operation with the International Atomic Energy Agency
- Language: English
- Participation: The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop: The purpose of the workshop is to:
- develop and instruct the participants in the NTD technology
 - introduce the latest development of NTD technology in the world
 - promote co-operation among RCA countries in the NDT technology.
- Participants' qualifications: Candidates are expected to be familiar with one of the following fields: Neutron Transmutation Doping (NTD) silicon; irradiation facility of reactor; radiation application; irradiation defect. The participants will be invited to review activities of NTD technology in their home countries.
- Nature of the workshop: Two types of information will be dealt with during the workshop:
- the ongoing activities in the developing RCA Member States as reviewed by the participants
 - the scientific and technological aspects of Neutron Transmutation Doping, including irradiation facility, neutron flux control, irradiation defect of silicon and its annealing method and application of NTD silicon in semiconductor devices.

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 May 1992. 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 to 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 full cost of the participants air travel from their home countries to Beijing and return and pay the participants a stipend sufficient to cover the cost of their accommodation, food 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.

REGIONAL (RCA) WORKSHOP ON NEUTRON TRANSMUTATION DOPING TECHNOLOGY,
BEIJING, CHINA, 5 - 10 OCTOBER 1992

C7-RAS-0.015-009

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Project Title and Number: ENERGY AND NUCLEAR POWER PLANNING (RCA) RAS/0/013

Project Description: The project aims to provide RCA Member States with a clearer insight into long-term energy supply options and the optimum economic share of nuclear power in each country. This is being achieved through the fostering of regional co-operation and exchange of information in energy and nuclear power planning and, in particular, to promote the exchange of information and experience; and stimulating collaboration among RCA countries in the use of the Agency's WASP/MAED models as sound methodologies for energy and electricity planning, including nuclear power planning.

Participating Member States: Bangladesh, China, Indonesia, Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Viet Nam.

Project Officer: P. Molina

Major Activities and Achievements in 1992

1. Regional Training Course on Electric System Expansion and Planning, Lahore, Pakistan, 26 April to 4 June 1992.

Time-table for Planned Activities in 1993

1. Project Formulation Meeting, Jakarta, Indonesia, July 1993.

PROJECT NO: RAS/0/013
PROJECT TITLE: Energy and Nuclear Power Planning
PROJECT OFFICER: Pablo E. Molina

Activities in 1992

A Regional Training course on Electric System Expansion Planning (WASP) was conducted for 30 participants from nine RCA countries in Lahore, Pakistan, from 26 April to 4 June 1992. The course which was hosted by the Government of Pakistan was held at the Water and Power Development Authority (WASPDA) in collaboration with the Atomic Energy Commission of Pakistan (PAEC). Financial support for the course was provided by the Asian Development Bank (ADB). Support was also obtained from the UN Economic and Social Commission for Asia and the Pacific (ESCAP). Assistance in kind was also provided by the Government of Canada through a project of the Canadian International Development Agency (CIDA) that is being carried out for Pakistan by ACRES International Limited.

The main objective of the regional course was to train the participants on the techniques for electricity system expansion planning with particular emphasis on the use of the IAEA's computer model WASP (Wien Automatic System Expansion Planning). For this purpose participants were grouped in national teams, each one having the responsibility of conducting a WASP study based on real data applicable to the country. Ten such teams were composed for the following countries: China, Indonesia, Republic of Korea, Malaysia, Pakistan (2 teams), Philippines, Sri Lanka, Thailand and Viet Nam.

The course was organized into several modules, grouping the principal aspects needed to be covered in this type of course. Lectures on the subject matter were intertwined with extensive work sessions, all geared towards the conclusion of the case studies to be conducted by the national teams. Presentations by the teams at several stages were also organized to report on the progress of work by each team.

Lecturers for the course came not only from IAEA Member States, but also from ADB, ESCAP, IAEA, Canada, Chile and Brazil. A total of 25 lecturers participated in the course.

The course was very successful in meeting all its objectives. Extended training in all aspects related to power generation system planning and in the use of the WASP package for this purpose was provided during the course. Each team completed a national WASP study, including the production of a report to document the work carried out by the team and the principal recommendations extracted from the study results. Most of these reports were of extremely good quality and thus were published in an internal document by the Agency that can serve as reference for future courses on the same subject.

There was a general consensus that such training courses do fill a need in the region and this suggests to continue to provide such courses in future, and to include in the IAEA's repertoire of regional training courses in energy and electricity planning not only the WASP course but also the ENPEP and MAED courses. Interest in other IAEA's supported models (VALORAGUA, ICARUS, LDC) was also expressed by some countries.

P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON ELECTRIC SYSTEM EXPANSION PLANNING
- Place: Water and Power Development Authority (WAPDA), Lahore, Pakistan
- Date: 26 April - 4 June 1992
- Deadline for nominations: 15 February 1992
- Organizers: International Atomic Energy Agency (IAEA), the World Bank (ESMAP), and the Asian Development Bank (ADB), in co-operation with the Government of Pakistan
- Language: English
- Participation: The training course is open to 25 candidates in national teams comprised of 2 - 3 individuals from developing RCA Member States in the Asia and Pacific region.
- Purpose of the course: The purpose of the course is to train staff in the techniques of power system planning and in the use of the IAEA's WASP computer model. Training in the use of the WASP programme will be based on the use of the version specially developed for personal computers (ENPEP version).
- Participants' qualifications: Applications should be presented in national teams, each consisting of at least two persons (maximum three) with experience in power system planning. Higher priority will be given to applicants with experience in the use of personal computers (PC). Participants should have at least three years of relevant professional experience.
- Nature of the course: The course will centre around a power planning study by each participating national team based on their own national data. The major course subjects will be: national energy planning, technical and economic characteristics of electric power plants, principles of generation planning, electric grid considerations, characteristics of the WASP model in its personal computer version (ENPEP) and auxiliary of optimum solutions, and preparation of a study report.

Application
procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official established channels (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, by 15 February 1992. 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 short information: name, age, academic background, present position and full address (incl. telex, facsimile and telephone numbers), to enable the IAEA to 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 or an embassy of a country in which English is spoken.

Administrative
and financial
arrangements:

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

The IAEA will pay the full cost of the participants' air travel from their home countries to Lahore and return. During their attendance at the course participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food 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 course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

REGIONAL (RCA) TRAINING COURSE ON ELECTRIC SYSTEM EXPANSION PLANNING

Lahore, Pakistan
26 April - 4 June 1992

COURSE SYLLABUS

1. INTRODUCTION AND BACKGROUND

- 1.1 Course Overview
- 1.2 IAEA Activities in Energy, Electricity and Nuclear Power Planning
- 1.3 Global Perspectives on Energy and Electricity and the Role of Nuclear Power
- 1.4 Basic Concepts of Engineering Economics
- 1.5 Computer (PCs) familiarization (PC-DOS/EDITOR/LOTUS 123/WORD PROCESSOR)

2. ENERGY/ELECTRICITY PLANNING OVERVIEW

- 2.1 Energy Planning in Developing Countries (Objectives, Approach, Scope, etc.)
- 2.2 Evaluating Energy Resources for Energy Planning
- 2.3 Evaluating Energy Supply Options for Use in National Energy Planning
- 2.4 Economic Analysis of Energy Planning
- 2.5 Priority Setting in Energy Planning
- 2.6 Electric Energy Demand and Load Forecasting
- 2.7 Environmental Considerations in Energy Planning
- 2.8 Description of the MAED Model
- 2.9 Execution on Energy, Electricity and Nuclear Power Planning Studies for IAEA Member States
- 2.10 Regional (ESCAP) Perspectives on Energy and Electricity Resources and Requirements
- 2.11 Bangladesh Perspectives on Energy and Electricity Needs and Planning
- 2.12 Indonesia Perspectives on Energy and Electricity Needs and Planning
- 2.13 Korea Perspectives on Energy and Electricity Needs and Planning
- 2.14 Malaysia Perspectives on Energy and Electricity Needs and Planning
- 2.15 Pakistan Perspectives on Energy and Electricity Needs and Planning
- 2.16 Sri Lanka Perspectives on Energy and Electricity Needs and Planning
- 2.17 Thailand Perspectives on Energy and Electricity Needs and Planning
- 2.18 Preparation of Data for WASP in Malaysia
- 2.19 Experience in Rep. of Korea with WASP and other Planning Tools
- 2.20 Applications of ENPEP (US and other countries)

3. BASIC CONSIDERATIONS IN ELECTRIC SYSTEM EXPANSION PLANNING

- 3.1 Introduction to Electric System Expansion Planning
- 3.2 Factors in Generation Planning
- 3.3 Screening Curves for Comparing Generation Options
- 3.4 Energy and Electricity Planning Reference Data

- 3.5 Special Considerations in Planning of Hydro Dominated Power Systems
- 3.6 Value of Reliability: LOLP & Energy Not Served
- 3.7 Cost of Unserved Energy in Developing Countries
- 3.8 Evaluation of Long-run Marginal Cost of Electricity Generation for Tariff Design
- 3.9 Environmental Issues in Electricity Supply Choices in Developing Countries
- 3.10 Power System Planning Under Uncertainty
- 3.11 Energy Efficiency in the Electric Power Sector - Demand Side
- 3.12 Economic Appraisal of Electric Power Projects - ADB Perspective
- 3.13 Requirements for a Nuclear Power Plant
- 3.14 Introduction to Nuclear Power Costs
- 3.15 Comparison of Generation Cost of Nuclear and Coal-fired Plants
- 3.16 Macroeconomic Considerations in Electric System Expansion Planning
- 3.17 Investment Decision making - Selection of Discount Rate for Power Expansion Planning
- 3.18 Financing Considerations in Electric System Expansion Planning
- 3.19 Use of WASP in World Bank Studies
- 3.20 Use of WASP in ADB Studies
- 3.21 Grid Interactions and Transmission System Considerations in ESEP

4. TECHNIQUES USED IN WIEN AUTOMATIC SYSTEM PLANNING PACKAGE (WASP) AND RELATED PROGRAMS

- 4.1 Overview of ENPEP
- 4.2 Special Representations in WASP (Co-generation, Interconnections, Pumped Storage, Combined Cycle)
- 4.3 Probabilistic Simulation in WASP
- 4.4 Loss-of-Load Probability in WASP
- 4.5 Dispatch of Hydroelectric Plants in WASP
- 4.6 Loading Order and Spinning Reserve Requirements in WASP
- 4.7 Development of Statistical Hydro Data for WASP
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REGIONAL (RCA) TRAINING COURSE ON ELECTRIC SYSTEM EXPANSION PLANNING,
LAHORE, PAKISTAN, 26 APRIL - 4 JUNE 1992

C7-RAS-0.013-006

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

Project Description: The project is a co-operative venture between RCA Member States designed to build up radiation protection infrastructure 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 co-ordinated research programme. A complete description is provided in the February 1992 Project Formulation Report which is available on request.

Participating Member States: Australia, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Viet Nam.

Project Officer: P. Strohal

Major Activities and Achievements in 1992

1. Project Formulation Meeting, Tokai, Japan, 26-30 June 1992.
2. Workshop on Personal Dosimeter Intercomparison (Japanese funded) October 1992.
3. Regional Workshop on "Development of Training Techniques and Methods of Instruction in Radiation Protection", (Australian funded) Sydney, 17-28 February 1992.

Time-table for Planned Activities in 1993

1. Expert Advisory Group Meeting, Beijing, March 1993.
2. Regional Workshop on Introduction to ICRP-60, Kuala Lumpur 1993.
3. Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples.

P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON THE DEVELOPMENT OF TRAINING TECHNIQUES AND METHODS OF INSTRUCTION IN RADIATION PROTECTION
- Place: Australian Nuclear Science and Technology Organisation (ANSTO), Education and Training Centre, Sydney, Australia.
- Date: 17 - 28 February 1992
- Deadline for nominations: 15 December 1991
- Organizers: The Government of Australia, through the Australian Nuclear Science and Technology Organisation in co-operation with the International Atomic Energy Agency within the framework of the Regional Co-operative Agreement (RCA)
- Language: English.
- Participation: The workshop will be open to 16 participants from developing RCA Member States in the Asia and Pacific region.
- Purpose of the workshop: The workshop will have three major objectives:
- to develop and instruct participants in the latest educational techniques
 - to adapt and utilise these techniques in the effective teaching of radiation protection, and
 - to develop uniform and standardised training methods in radiation protection
- Participants' qualifications: Candidates should be experienced radiation protection specialists and be good communicators of information with the ability to train other trainers in the course materials. It would be expected that the candidates on their return home, would be employed in the co-ordination and implementation of training programmes in radiation protection at a national level.
- Scope and outline of the workshop: The workshop will be divided into two inter-related parts:
- Part 1 - will concentrate on a review of teaching methods which have a general application in instructing students in all practical aspects of science and occupational health. The following will be discussed and where possible practical exercises will be utilised:
- education theory
 - syllabus and course development
 - teaching of theoretical subjects
 - teaching of practical subjects
 - use of modern teaching aids including simulation exercises
 - teaching and evaluation of training

Part 2 - will specifically concentrate on teaching methods for radiation protection subjects. The following aspects of radiation protection will be covered:

- principles of radiation protection
- safe handling of radioactive substances
- teaching radiation workers
- personal dosimetry
- operational health physics
- decontamination
- emergency response procedures
- environmental control
- conducting of practical sessions and exercises.

At the completion of the workshop, the participants will be able to:

- (a) select the most effective training methods for the instruction of students in radiation protection
- (b) manufacture and use modern audio-visual teaching aids including the use of personal computer graphic programmes
- (c) use computer based simulation programs particularly for instructing in emergency response procedures, and
- (d) conduct emergency response exercises.

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 or the Ministry of Agriculture). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 December 1991. 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 Australia will, out of its extra-budgetary contribution to RCA, defray the cost of the participants' air travel from their home countries to Sydney and return, as well as a stipend sufficient to cover the cost of their accommodation, food 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.

FINAL LIST

REGIONAL (RCA) WORKSHOP ON DEVELOPMENT OF TRAINING TECHNIQUES
AND METHODS ON INSTRUCTION IN RADIATION PROTECTION, SYDNEY,
AUSTRALIA, 17 - 28 FEBRUARY 1992

C7-RAS-9.006-005

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Project Title and Number: **COMPILATION OF ANATOMICAL, PHYSIOLOGICAL AND METABOLIC CHARACTERISTICS FOR A REFERENCE ASIAN MAN (J3.20.01)**

Project Description: The three major activities of the project are the compilation of data on physical/anatomical parameter, metabology and physiology.

Participating Member States: Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Thailand and Viet Nam.

Project Officer: R. Griffith

Major Activities and Achievements in 1992

1. Data is currently being collected by the participants. A letter has been sent to them requesting submission of their results.

Time-table for Planned Activities in 1993

1. Submission of data to IAEA for statistical analysis - April.
2. Final RCM - October/November.
3. Finalization of CRP report.

AUSTRALIAN COUNTRY STATEMENT
15TH RCA WORKING GROUP MEETING
MANILA, 16 -19 MARCH 1993

The renewal of a five-year term for the RCA after twenty years of steady progress is evidence that the RCA is a mature association of Asian-Pacific countries with significant benefits being realised in the peaceful applications of nuclear science and technology in regional Member States. Australia has maintained its involvement in, and support for, RCA/UNDP activities during the past year and is committed to continuing support in our new project.

The success of effective technology transfer is dependent on proper planning, development of human resources, and support for appropriate infrastructure development. Activities such as training courses, workshops, fellowship training, provision of expert services and supply of equipment each contribute to the capacity and capability of individual Member States to use and develop nuclear technology for peaceful applications. The ability to sustain development at the national level in the industrial and medical applications of nuclear technology, and the targetting of end users of that technology, are important considerations when designing and implementing RCA projects.

Australian Projects

The Australian sponsored project deals with the application of isotope and radiation technology to regional development with special reference to industry, including industrial radiation protection, and nuclear medicine. Its overall objective is to contribute to regional development through a combination of institute infrastructure development, personnel training, and equipment support through activities related to industrial and medical applications of isotopes. The project has been designed to specifically meet IAEA and UNDP requirements and with close linkages to the activities and outputs of several parts of the UNDP project. The project is funded by Australia's extra-budgetary contribution to the RCA at the level of \$1,500,000 for the next 3 years.

Preparations for implementing the project are well advanced with a Regional Training Course on the industrial applications of radioisotopes scheduled to be held in Sydney from 3 to 14 May 1993. Emphasis during this course will be placed on technologies designed to improve production efficiency, enhance the recovery of natural resources, and to monitor and reduce the environmental impact of development. Following the course, a series of national seminars are to be offered to augment the process of technology transfer to end users.

Invitations were issued in December 1992 to RCA countries to choose two topics for national seminars from a list of seven topics covering a range of applications of nuclear techniques to various industrial and environmental sectors. The choice of national seminar topics in nuclear technology applications include the following areas: surface coatings, coastal engineering, waste management, chemical and refining industries, metals and manufacturing industries, off-shore resources development, and environmental impact assessment. The development priorities of each Member State need to be considered when deciding on the appropriate field for their particular national seminar.

There will also be a regional training course on the applications of nuclear techniques to materials science scheduled for April 1994. This course could be readily integrated into the proposed project on nuclear techniques for materials characterisation. The requirements for distance learning packages in industrial radiation protection, in support of the industrial applications component of the project, are currently being refined within Australia.

For the nuclear medicine component, nominations have been called for membership of the Regional Advisory Committee which has several important tasks involved with steering the project. These include reviewing country needs and course syllabus content, and advising and liaising with the nuclear medicine community throughout the region. Additionally, Country Coordinators will be responsible for ensuring effective implementation of the project within their country. The network of national nuclear medicine counterparts that has been created during the previous Australian sponsored nuclear medicine project will ensure effective management and implementation of the project as well as keeping the project fully responsive to the needs of Member States.

New Research Reactor Proposal for Australia

This RCA Working Group meeting provides an opportunity to inform Member States of recent nuclear technology developments in Australia.

ANSTO has proposed a new research reactor to replace the HIFAR reactor with a view to operation early next decade. The first stage in this process was the submission of a case to the Australian Science and Technology Council (ASTEC) which was undertaking an inquiry into major new research facilities on behalf of the Australian Government. The ASTEC inquiry identified seven major facilities having the highest priority for development in Australia over the next 5 to 10 years. A replacement research reactor was among these facilities.

However it was considered that a new research reactor for Australia would be an issue of considerable social and political sensitivity. To ensure that all the issues are properly considered and that all interested persons and groups have an opportunity to put their view, the Minister for Science and Technology announced details on 30 September 1992 of a Research Reactor Review to enquire into Australia's need for a new research

reactor. It is expected that the Review will make a thorough examination of Australia's involvement in research reactor technology, utilization and research and development activities.

The three terms of reference of the Research Reactor Review are as follows:

1. Whether, on review of the benefits and costs for scientific, commercial, industrial and national interest reasons, Australia has a need for a new nuclear research reactor.
2. To review the present reactor HIFAR, including an assessment of the national and commercial benefits and costs of HIFAR operations, its likely remaining useful life and its eventual closure and decommissioning.
3. If the finding on the first term of reference is that Australia has a need for a new nuclear research reactor, the review will consider:
 - possible locations for a new reactor,
 - its environmental impact at alternative locations,
 - recommend a preferred location,
 - evaluate matters associated with regulation of the facility and
 - evaluate organisational arrangements for reactor-based research.

Submissions to the Review were required by 19 February 1993 and the first public session of the Review was on 8 March 1993. It is anticipated that the Review will hand down its finding on the first term of reference, the need for a replacement reactor, in July 1993. It will then reconvene to consider the third term of reference, namely the siting and environmental considerations for a new reactor if the response to the first term of reference is positive and also to further consider the remaining life and decommissioning of HIFAR.

ANSTO has prepared a detailed submission for consideration by the Review. This covers the full range of matters listed in the terms of reference including details on the specification and applications of the proposed new reactor.

Conclusions

Australia believes that the technical cooperation and regional expertise and infrastructure developed as a result of the RCA provides significant benefits towards regional prosperity and understanding. Australia looks forward to its continued participation in RCA/UNDP activities. Much has been achieved to date and we are pleased to note the strong commitment from all RCA Member States to the future program.

COUNTRY STATEMENT OF THE PEOPLE'S REPUBLIC OF CHINA
15TH RCA WORKING GROUP MEETING,
MANILA, PHILIPPINES, 16-19 MARCH, 1993

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

It is my great pleasure to be here to attend this 15th RCA Working Group Meeting, and I would like to congratulate you on your election as chairman of the meeting.

The RCA, in its 21 years of existence, has made tangible contributions to the promotion of peaceful uses of nuclear science and technology for the benefits of this region. China has been actively participating in almost all RCA programmes since its inception in 1985. We are confident that RCA is the most useful instrument for the transfer of technology of nuclear science and technology to member countries in the region.

Since 1989, China has made her extrabudgetary contribution to RCA activities. Last year, we hosted two activities of this kind, RW on NCS-Steel and RW on NTD Technology. China will continue making her extrabudgetary contribution to RCA activities as before, \$50,000 every year. In 1993, We will organize two activities, Regional Workshop on Economic Analysis of Radiation Processing Facilities, and Regional Workshop on Radon Monitoring.

Now, I would like to take this opportunity to give a brief account of the status of RCA activities in China in last year.

I. UNDP INDUSTRIAL PROJECT

1. Tracer Application

Tracer Application in Chinese industries has been spreaded in many sectors, hydrology, petroleum logging, chemical industry and many others. At the request of the Sri Lanka Atomic Energy Authority (SLAEA), and with the support given by the IAEA, five Chinese experts from Shanghai Institute of Nuclear Research (SINR) undertook a 12 days mission (9-20 March, 1992) to carry out a demonstration on leak-detection of buried fuel oil pipeline at the Ceylon Petroleum Co. (CPC), Colombo, Sri Lanka. The demonstration showed that the leak-detection technique using radiotracer is a very useful technique. After this case, one Indonesian company also showed its interest on this technique.

2. Non-Destructive Testing (NDT)

In China almost all industrial sectors have established their NDT (NDE) institutions (Societies). Every year National Training Courses and Seminars are held in different places.

In nuclear industry, NDT techniques are very important tools for nuclear power plant construction and safe operation, for nuclear fuel elements manufacture, and many others. In 1993, we will arrange a National Workshop on NDT technique for Nuclear Fuel Elements Manufacture, in Chengdu, Sichuan Province. If possible, we welcome the Agency to send experts to the workshop. In 1992, 2 participants from China attended the Regional Training Course on NDT in nuclear power plant in Seoul. They have applied the knowledge gained from the course to the pre-service inspection of Da Ya Bay Nuclear Power Plant.

It is very important to introduce NDE Technology for metallic materials into new industries or those industries where it is underutilized and also for non-metallic construction materials.

It is also important to harmonize NDE Standards in the region through Regional Model Qualifying Examinations Proficiency Testing Programmes and regional production of standard test pieces.

3. Radiation Processing

(1) IMRP-8

The 8th International Meeting on Radiation Processing (IMRP-8) was held in Beijing, from 13-18 September 1992. IAEA was the co-sponsor of this very important meeting, Dr. S. Machi, the DDG-RI attended and gave an invited report on Radiation Processing Technology in 1990's. More than 300 experts attended this meeting.

Complete views of recent development and world status were presented, including Gamma and EB facilities, radiation crosslinking, radiation grafting, radiation polymerization, radiation degradation, radiation sterilization, radiation vulcanization, radiation curing, food radiation preservation, environment application, bio-medical application, dosimetry, standards and codes, facility safety, international co-operation and many others.

Before and after this meeting, IAEA organized four meetings and training courses on radiation processing special topics in China. The Proceedings of IMRP-8 will be published this year.

(2) Radiation Sterilization

Now in China, there are more than forty Co60 gamma facilities. Almost all facilities do radiation sterilization services for medical supplies.

We suggest that a Regional Seminar on Standard of Industrial Radiation Sterilization be held in Beijing, hosted by Beijing Radiation Center (BRC). The aim of this seminar is to discuss and form the regional standard based on international standard (ISO), and to visit some GMP factory and GRP radiation center.

(3) Radiation Curing

We are very interested in the development and achievement of the radiation curing (EB/UV) technology. In Shanghai, Chengdu, Hefei, Beijing, many universities and institutes are actively conducting R & D on Radiation Curing, and promoting technology transfer to industry. We suggest, a National Training Course on Radiation Curing will be held in Chengdu, China in 1993. We are expecting support from IAEA or Australian funded project.

(4) Radiation Vulcanization of Natural Rubber Latex (RVNRL)

Dr. K. Makuuchi, IAEA expert, visited Beijing and Zhuzhou, after the IMRP-8 Meeting, from 18-23 Sept. 1992, discussed with Chinese counterpart, the Zhuzhou Latex Research Institute about the recent research advancement on RVNRL in China. The key problem of the development of RVNRL technology in China is the economic effect.

(5) Radiation Crosslinking

We have organized many RTCs, NTCs and NEMs on Radiation Crosslinking application in wire and cable industry. They have prompted and demonstrated the technology, and transferred to the industry. In order to further extend the technology to end users, a National

Training Course on Processing Technology of Radiation Crosslinking of wire and cable Insulations and others will be held in Shanghai this year. This can be seen as an extension of UNDP/IAEA/RCA Regional activities on Radiation Crosslinking application.

(6) Environmental Application

National Seminar (NEMS) on Electron Beam treatment of flue gases will be held from 14-17 Sept. 1993 in Shanghai in co-operation with the IAEA TC Project. The purpose of the Seminar will be to provide up-to-date information in EB treatment of flue gases technology and research results from foreign pilot plants for the removal of SO₂ and NO_x emitted by coal-fired power plants and incinerators, so as to disseminate this technology for control of air pollution and acid rain in China.

(7) Biomedical Application

We suggest that the Agency sponsor a Regional Workshop on Radiation Preparation of biomedical Materials-Drug carrying system, Immobilization, Artificial organs in 1994. As a follow-up of 1992 Beijing Research Co-ordination Meeting on Radiation Technology Application for Bioengineering (Sept. 1992, Beijing University). The Shanghai University of Science and Technology will be able to host the workshop.

4. Nucleonic Control System (NCS) Application

(1) NCS-Steel

The Regional Workshop on NCS in Steel Industry was held in Shanghai from 8-12 June 1992. 15 participants from RCA member countries, 21 participant-observers from China attended. The workshop was quite successful. Through lectures, case study, on-site visit and round table discussion, the participants got more knowledge and information about the application of NCS in Steel industry. Some participants (India, Pakistan, Bangladesh and Viet Nam) have shown their interests on some China-made NCS, such as nuclear weigh scale, thickness gauge, coal ash gauge. We are very interested in TCDC on NCS-Steel, we can arrange more regional activities on NCS-Steel.

(2) NCS-Paper

Now in China more than hundred sets NCS have been installed in paper mills. In China there are many more small and medium paper mills, so the application of low cost NCS specially for small and medium paper mills is more important. We have demonstrated these low cost NCS in some paper mills, and we can contribute these to other countries, we hope such NCS can serve Asia region industry. If possible, we are prepared to host regional or national workshop on NCS-Paper in 1993 or 1994 with the support of the Agency.

(3) NCS - Other industry

Now in China, Nucleonic Control System is also extensively used in coal, mineral, petroleum, civil engineering, cement, chemical and many other industries.

5. Nuclear Analytical Technique

Nuclear Analytical Techniques such as neutron technique, charged particles technique and X-ray technique are very useful ones for environmental studies.

We strongly support nuclear analytical technique as a sub-project of the new RCA/UNDP Industrial Project.

II. FOOD IRRADIATION PRESERVATION

The Regional Workshop on Food Irradiation Process Control was held in Shanghai from 31 August to 11 September, 1992. 17 participants from 9 RCA Member States attended. Some managers, supervisors, inspectors and operators of the irradiation facilities were trained on process control, standards, codes, and practicals of food irradiation.

A Research Co-ordination Meeting on Food Irradiation Regional Project was held in Beijing 21-25 September 1992, 16 participants and 16 observers attended. Recent development in commercialization, marketing and consumer acceptance, new facilities, technical transfer, GMP and GIP are discussed.

At IMRP-8, the food irradiation session was the number one biggest technical session, all the participants were very interested in recent advance of food irradiation.

Last year, some irradiated foods were sent to Sri Lanka, Malaysia and Pakistan from Chengdu and Shanghai, China for inter-country trade test, Feedback of the test results and any comments are appreciated.

China has commercially irradiation treated over 6000 tonnes foods every year, commercialization of irradiated foods will be the main target in China in recent years.

III NUCLEAR AGRICULTURE

From 13 to 17 July 1992, the 3rd Research Co-ordination Meeting on the use of isotopes in studies to improve yield and nitrogen fixation of grain legumes in the tropics and sub-tropics of Asia was held in Harbin, China. 13 participants attended the meeting.

Nuclear Techniques applied in Chinese agriculture are popularized. We can offer related techniques, experts and others for service to the region.

Radiation mutation breeding of crops, combined with in-vitro culture and other techniques for rice, wheat, soybean, maize, citrus, cotton and others.

Low dose stimulation of growth and development, fish, shrimp and prawn and silk worm.

Isotope tracer applied to insecticide residues, environmental protection and fertilizers application study.

Radioimmunoassay and ELISA for animal disease and health. Food Irradiation Preservation.

Labelled compounds for agriculture, insecticides, fungicides, acaricide, biological agents, herbicides and others.

Application of nuclear technology in agriculture can make remarkable economic and social benefits and is important to improvement of people's life. It is desirable that a certain portion of RCA budget be used for agricultural projects. As to the new project proposals tabled before us, we support it in principle from the technical point of view. Detailed comments will follow.

IV MEDICAL AND BIOLOGICAL APPLICATION

Two advanced national workshops on Quality Control and SPECT were held in Beijing and Shanghai in November 1992. More than 50 participants attended from all over China. This was a follow-up activity of the 1991 similar title activities.

A regional training course on Radiation Sterilization of Tissue Grafts with emphasis on clinical and sterility quality assurance took place in Taiyuan, 1-12 September 1992, and was attended by 20 participants from 10 RCA Member States.

The 5th Meeting of the Asia-Pacific Association of Surgical Tissue Banking and related IAEA RCM Meeting will be held in Suzhou, Jiangsu Province, China in May 1994.

The Regional Training Course on Radiopharmaceuticals preparation and Quality Control was held in Beijing from 16 August to 5 September 1992. In 1991 and 1992, reagents for diagnosis of Hepatitis-B made in China supplied some states in the region which has promoted the use of radioimmunoassay. In order to transfer technology of making bulk reagents, China will host the Regional Training Course on the preparation of basic reagents for the RIA of Hepatitis-B Markers in Beijing from 26 April to 7 May 1993.

China strongly supports and participates in the following RCA nuclear medicine activities: Nuclear Instrument Maintenance and Quality Control, Radioimmunoassay Application, Radioaerosol inhalation imaging for the diagnosis of respiratory diseases, radiotherapy dosimetry, use of computer in Nuclear Medicine, Computerized Management of Preventive Maintenance (CMPM), Regional end-user unions of nuclear medicine equipment, radiation sterilization of tissue grafts and many others.

V. RADIATION PROTECTION

China participated in the Second Project Formulation Meeting held in Tokai in June 1992. Chinese expert emphasized following project. ICRP-60 Recommendation. Asian reference man, personnel dosimetry intercomparison, Radon monitoring, radiation facilities safety.

The final research co-ordination meeting on Asia Reference Man will be held in Taiyuan, from 13-15 July 1993. We are pleased to host the Expert Advisory Group Meeting on Radiation Protection Infrastructure RAS/9/006, which has just finished in Beijing. The more concrete and detailed plans for phase II were discussed and formulated at the meeting.

We suggest the Regional Workshop on Radon Monitoring to be held in Hengyang, China, late in 1993. This is contributed by Chinese donation.

VI. RESEARCH REACTOR UTILIZATION AND ENERGY PROGRAMME

In China, there are six research reactors in operation. Our first nuclear power plant - Qinshan NPP was put in operation in 1991. We have a programme to construct more nuclear power plants for the benefit of national economic development. So, research reactor and energy programme is very useful for us.

The Regional Workshop on Neutron Transmutation Doping Technology was held in Beijing from 5 to 10 October 1992. 14 participants from 9 RCA Member Countries attended. NTD technology, its latest development in the world and the promotion of co-operation among RCA countries in this technology were discussed.

The Regional Training Course on Materials Characterization Using Low and Medium Neutron Flux Reactors was held in Beijing, from 26 October to 13 November 1992. The course provided participants with theoretical knowledge and practical training on the techniques and methodology of using neutron techniques (neutron diffraction, small angle scattering, and others) for material investigations and development. The course was attended by 15 participants from 11 RCA Member States (including China).

As a follow-up, another Regional Training Course on Nuclear Methods in Material Development will be hosted by the China Institute of Atomic Energy (CIAE) in Beijing from 6-29 Sept. 1993. The application of neutron beam and other nuclear analytical techniques will be discussed.

China also participated in and showed interest in such projects as measurement of basic parameters of research reactors, safety documentation for research reactors, application of personal computers to enhance operation and measurement of research reactors.

With regard to the energy and nuclear power planning project, China has actively participated in the WASP and MAED model course, in the future, the ENPEP course also will be needed.

We suggest that the Agency sponsor a workshop on ENPEP to provide an opportunity for Member States to exchange their experience and promote the use of the ENPEP model. China is willing to host such a workshop.

Mr. Chairman, Ladies and Gentlemen,

The Chinese delegation has great pleasure to see the success of RCA programme in technology transfer in the past years. As the rapid economic growth in this region, closer technical and economic links among the countries in the region will be more important. While the past experiences and good practices should be continued, more attention should be focused on transferring technology to end users and obtaining more economic and social benefits. Considering the condition in developing countries, the RCA projects and activities should put more emphasis on development and extensive application of low cost technology and equipment. Meanwhile, the co-operation to economic co-operation and bilateral commercial trade is encouraged. The Agency can probably play roles in catalyzing such co-operation. Through RCA activities, some of technology and equipment developed by China has successfully been transferred to other developing countries in the past, such as crosslinking technology, radioisotopes, N-15 labelled compounds, cobalt therapy device, miniature neutron source reactor (MNSR) and some kind of accelerators and etc. We also have capabilities to transfer other technologies and equipment such as low cost NCS, gamma facilities and mutation breeding etc. We are ready to share our knowledge and experience with other countries as we have done before and will continue to make our financial contribution as far as we can.

Also, we take this opportunity to express our sincere thanks to Australia and Japan for their generous support to RCA programme.

Finally, I would like to join other delegates to express our thanks to the Government of the Philippines, the Philippine Atomic Energy Commission, the Philippine Nuclear Research Institute, for hosting this important 15th RCA Working Group Meeting and for the warm hospitality extended to us during our stay in Manila, Philippines.

Thank you.

15th Working Group Meeting of RCA Member States

Manila, March 16-19, 1993

Country Statement - India

(R.G. Deshpande, Chief Executive, Board of Radiation & Isotope Technology, Bombay, India)

1. INTRODUCTION

India is very happy to participate in the 15th Working Group Meeting of RCA Member States being held in Manila. It may be recalled that the Phillipines had hosted the India-Phillipines-Agency (IPA) Project which was the forerunner of the RCA Project. IPA was successful in training scientists and engineers from countries of Asia & Pacific with different cultural background and educational systems in new technologies which would form the basis of national R&D Programmes in the area of nuclear sciences & technology. The outstanding success of the IPA project led to the formulation of the present RCA, which has been extremely successful as witnessed by its successive renewals. I would like to take this opportunity to thank the Government of Phillipines for hosting this meeting in Manila and would like to convey the greetings of many Indian scientists who participated in the IPA to the scientists of the Phillipines Nuclear Research Institute.

India recognises the important role nuclear technology can play in national development and has modelled its development programmes in the nuclear field with considerable emphasis on self-reliance. This has also made it possible to spin-off technologies, developed initially for the nuclear programme, for developments in other sectors. Considerable amount of technical expertise has been generated as a result of implementation of nuclear energy programme and we are now making sustained efforts to transfer this knowledge and expertise to other areas. We are continuing to work on all aspects of nuclear fuel cycle, and in areas of production & applications of radioisotopes, and we will be happy to share our experience & facilities with scientists from other member states. In fact we regularly offer training facilities to scientists from many countries in different aspects of nuclear technology through Agency's fellowship program and other bilateral arrangements.

2. MEDICAL & BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUE

In the project on Quality Control of Advanced Nuclear Medicine Equipment, quality control tests were performed, initially, in equipment located at 5 nuclear medicine centres and information on various parameters in the planar gamma camera and SPECT system as also the computer system was obtained. This assessment brought out gross non-uniformity in one unit which was traced to faulty collimator whereas non-uniformity noticed in another unit was traced to the bulging of refillable uniformity phantom. Increased awareness of importance of quality control of gamma cameras has been created amongst a large number of users and it is proposed to organise a national workshop on quality control aspects of nuclear medicine equipment. In the project on Radioaerosol Imaging for Diagnosis of Respiratory Diseases, the evaluation of the effects of environmental pollutants on the integrity alveolar/capillary interface in the lungs has been done using Tc-99m DTPA aerosol ventilation and quantitation of its deposition and clearance kinetics. 30 normal subjects residing for over 5 years in a particular locality of Bombay were selected and the data obtained on particulate and gaseous pollutants in atmosphere and the change in lung physiology was correlated. The final data is being analysed. The Tissue Bank set up at the Tata Memorial Centre, Bombay under the project on Radiation Sterilization of Tissue Grafts has worked satisfactorily and has provided allografts and non-viable freeze-dried, irradiated biological dressings for use in treatment of burns, non-healing ulcers, in reconstructive surgery, orthopaedic surgery etc. A Regional Workshop on Computer-Assisted Planning and Dosimetry for Carcinoma of Cervix was hosted by India at the Tata Memorial Centre, Bombay during June 1-5, 1992. In the project on RIA of hepatitis B considerable logistic problems were faced resulting in the delayed receipt of the kits from the Chinese suppliers i.e. beyond the expiry date. It appears necessary to adopt alternative modes of transport which can overcome the problems faced by the recipients in various participating countries.

3. FOOD & AGRICULTURE PROJECTS

India participated in the Regional UNDP Project on Food Irradiation Process Control & Acceptance and has been assigned two research agreements under this project. Microbial analysis of minor spices stored in P.P. bags over a period of upto 12 months showed that the bacterial count in controls ranged from 10^2 - 10^3 cfu/g whereas it was nil in the irradiated samples. As a part of inter-country

transportation studies irradiated & control samples were sent to Atomic Energy Authority of Sri Lanka for assessment of quality and consumer acceptance. The work carried out under the research agreement on quarantine treatment of mango fruit showed that outright kill of seed weevil cannot be achieved by exposure to dose levels tolerated by the fruit. The results indicate that for practical application of irradiation as a quarantine treatment against mango seed weevil, it will be necessary to change criteria presently used for quarantine security from mortality to inability to produce viable offsprings.

4. RESEARCH REACTOR UTILIZATION & ENERGY BASED PROJECTS

India has always supported projects in the area of research reactor utilization and has shared its facilities with the scientists of RCA member states in pursuing research programmes of mutual interest. As indicated elsewhere in this report, India will conduct a Regional Workshop on Applied Aspects of Neutron Scattering using the facilities built at Trombay for the benefit of scientists from RCA countries. India is happy to note that more activities have been started under this project. Under an IAEA Research Contract work is being carried out at BARC on the on-line use of PC to monitor and evaluate important research reactor parameters including reactor thermal power, reactivity load due to xenon, thermal power output of individual fuel assembly, main coolant inventory, and performance monitoring of some of the safety related components. The PC-AT system is expected to be available for use by end June '93 and the software developed is being tested.

5. RADIATION PROTECTION INFRA-STRUCTURE PROJECTS

India has actively participated in projects relating to development of radiation protection infrastructure in RCA countries. India participated in the project formulation meeting for Phase II held at Tokai during June 22-26, 1992. In the project on inter-comparison of personnel dosimeters, the intercomparison experiments for gamma sources conducted between JAERI and BARC showed agreement to within $\pm 3\%$. In the CRP on Reference Asian Man, the work on the collection and generation of physical, anatomical, physiological and metabolic human parameters was continued to develop the human model. Some preliminary conclusions drawn from the studies carried out so far include (i) the average Indian is much smaller in weight and height as compared to ICRP Reference Man representing the Caucasian population and

(ii) the daily consumption of fluids for the adult Indian population is higher whereas the body water content is lower and this is likely to lead to faster turn-over rate for nuclides like tritium.

6. INDUSTRIAL APPLICATIONS OF RADIOISOTOPES & RADIATION

The momentum generated by the implementation of the 2 phases of UNDP Industrial Project on Industrial Applications of Isotopes and Radiation Technology was sustained during the last year. In the area of tracer technology, apart from providing service to industry in trouble shooting (e.g. leak detection) developmental work using radiotracer technique was carried out for gas flow measurements and for studies of dispersion of municipal sewage off the Bombay coast. In the later studies, the tracer data will help in the design of the outfalls. Development of suitable equipment and standardization of procedures for gamma scanning of distillation towers & packed bed columns in industrial process plants was completed. In the field of radiation processing, a radiation plant for RVNL was commissioned at the Rubber Institute at Kottayam, and the cobalt-60 loading of the three radiation sterilization plants currently in operation was increased to meet the increased demand for irradiation services. An indigenously developed and fabricated remote cable operated radiography camera housing 35 Ci of iridium-192 source has been introduced for industrial use.

7. NUCLEAR INSTRUMENTS MAINTENANCE

Under the programme for upgradation of gamma cameras, a PC interface card for coupling analog gamma camera to IBM PC Computer was developed & tested at the Electronics Division, BARC. The clinical software developed for gamma camera applications is being tested at the Radiation Medicine Centre, Bombay. The revised version of the computerised management of preventive maintenance (CMPM) programme was developed and demonstrated at the Regional Consultants Workshop at Kuala Lumpur in September 1992. 3 scientists participated in the Agency meetings on spare parts supply, upgradation of gamma cameras and development of CMPM packages. One scientist from BARC demonstrated the indigenously developed spectroscopy amplifier in the Regional Workshop on Evaluation of Modern Spectroscopy Amplifiers held at Dalat during 7-23 January 1993.

8. INDIA'S EXTRA-BUDGETARY CONTRIBUTION TO RCA

India organised a Regional Training Course on Advanced Mutation Breeding of Tropical Crop Plants at the Bhabha Atomic Research Centre during 16-27 November 1992 from its extra-budgetary contribution to the RCA. The course was attended by 15 participants from RCA countries and was a mix of formal lectures and demonstrations. The course programme included methods of breeding for disease resistance, insect resistance and abiotic stresses, end use quality improvement, photo period - insensitivity etc with emphasis on the induction of genetic variability for such trials. Many advanced biotechniques including Southern blot, Western blot, ELISA, DOT immunobinding assay, DNA analysis were included as supporting techniques.

During 1993 India will conduct a Regional Workshop on Applied Aspects of Neutron Scattering at BARC, Bombay during November 22 - December 10, 1993. The workshop will comprise of lectures on basics of neutron scattering and its applied aspects in materials science, metallurgy, chemistry & engineering. Demonstration experiments will be arranged using neutron beam facilities set up at Dhruva & Cirus reactors at Trombay. The workshop is being organised out of India's extra-budgetary contribution to RCA.

During 1994 India proposes to organise a Regional Workshop on INIS which will be funded from India's special contribution to the RCA. The 2 weeks workshop will cover subjects such as INIS input preparation, processing of INIS output tape, use of INIS CD-ROM, basics of personal computers and computer networking, basics of CD-ROM drives used in personal computers, on-line search and INIS input submission using E-Mail. The faculty for the workshop will be provided by various divisions in BARC.

9. CONCLUSION

India's participation in the RCA programme over the years has been very satisfying and productive. We look forward to the further growth of RCA activities in close co-operation with other RCA member states.

COUNTRY STATEMENT OF INDONESIAN DELEGATION
AT THE FIFTEENTH RCA WORKING GROUP MEETING
16 - 19 March 1993
Manila, Philippine

Mr. Chairman

First of all my Delegation would like to join the previous speakers in congratulating you upon your election as Chairman of this Working Group Meeting. I am confident, that under your wise guidance and experience this important meeting will result useful and fruitful outcomes.

It is my great pleasure to participate in this fifteenth RCA Working Group Meeting in Manila, the metropolitan of the Philippines, which I have visited this beautiful country for the first time about twenty three years ago in 1970. Many changes and progresses have been occurred during that period, I am very happy to be here again.

May I recall that Indonesia is an active member country of the RCA since 1972 and has participated in almost all RCA activities since the beginning. It is obvious that RCA is the most effective vehicle in regional co-operation. We have confidence that much benefits have been gained by all Member States from this effective co-operation, mainly in the transfer of nuclear science and technology in the region.

In regard with the report to be presented at this meeting, my Delegation would like first of all to begin with the activities executed in the country in the context of the industrial project on the application of isotopes and radiation. Although the project is formally terminated at the end of 1991, there were still some activities left for implementation in 1992.

1. Radiation Technology

Activity on radiation technology is one of the national sustainable nuclear technology program which BATAN is very much concerned about.

Radiation vulcanization of natural rubber latex (RVNRL)

R & D on radiation vulcanization of natural rubber latex is continued to overcome the sticky problem on the dipping products of gloves and condom. R & D on the application of RVNRL for the production of rubber goods such as foam, rubber composite, adhesives, thermoplastic elastomer are also conducted. Three research scientists from Vietnam (Mrs. Nguyen Quoc Hien, Doan Binh and Dinh Van Binh) have visited CAIR-BATAN for about five weeks in 1992 under UNDP/IAEA/RCA project, RAS/0/015/-11. The purpose of the visit was to study on irradiation of Vietnam origin's rubber latex. About 1.8 ton latex were sent from Vietnam to CAIR-BATAN for irradiation studies.

PE Crosslinking

A research group to study the optimum condition of PE crosslinking for insulator material was established.

Biomaterial

R & D on the preparation of polymer synthetic based on PVA and PVP were conducted under a Bilateral Technical Co-operation with JAERI Japan, and partly supported by the project under the IAEA technical assistance.

Surface Coating

Economic feasibility study on the application of the 300 KeV EBM for wood panel surface coating indicated not to be competitive with the present conventional process available in Indonesia, due to the high cost of prepolymer, high operational cost of the machine and less interest given by the plywood companies.

Sterilization of medical devices

Radiation sterilization of several kinds of medical devices is continued. The current radiation service done by CAIR-BATAN is limited to research and demonstration purposes only while the commercial irradiation services are conducted by the private owned irradiation facility INDOGAMA. A necessary step for the experiment using EBM has been initiated.

2. Non-Destructive Testing (NDT)

As the UNDP/IAEA/RCA Industrial Project has been terminated at the end of 1991, training courses on NDT were still conducted in Indonesia although mostly have been executed without the assistance of IAEA expertise except for RT Level III, and Acoustic Emission Method some experts were still provided by the IAEA.

Courses on RT Level I (4x), Level II (1x), UT Level I (6x) UT Level II, Plate and Pipe (3x), UT Level II, all configurations (1x), TOT-RT I (1x) assisted by Mr.Warmorkar, Acoustic Emission I (1x) assisted by Mr.Emilio Fontana, RT/MT Level I (1x) and RT Level III (1x) assisted by Mrs.N.Ooka, Y.Yukono, and N.Nakamura, NDT in general (3x) and radiographer interpretation (3x).

The Indonesian Society for Non-Destructive Testing has been established in August 1992, and the Proficiency Testing Program has been conducted for both UT and RT Level II with the assistance of Mrs.Norikazu Ooka, Y.Yukono and M.Nakamura. There were 14 participants from the governmental Institutions and NDT private companies took part in this program.

For the next program my Delegation would like to propose, that PTP program should be continued. We assume that through the program, the IAEA could monitor the lacking of the NDT personnels in RCA Member countries in order to set-up the need for training courses in the future.

The assistance of the IAEA expertise to meet the requirement

of the training courses on UT, ET and RT III is still needed. As conventional methods (RT, UT, ET, SM) have been carried out for many times, it is advisable to follow up with the advance methods, such as Accoustic Emission, Leak Test and the application of NDT in Nuclear Power Plant.

3. Tracer Technology

Three activities have been carried out before the end of 1992 as follows:

- a) An Executive Management Seminar on Tracer Application in Industry was held in August 1992 and was attended by more than 20 participants mostly coming from the industrial and oil sector. A field demonstration on measurement of steam flow rate in a pipe line at the geothermal field Kamojang, West Java was included in the program. Two experts from ANSTO have paid fully contributions for lectures, discussions and demonstrations.
- b) Two scientists from BATAN have joined in an ANSTO project at a gold mine company, PT.Kelian in Kalimantan. The aim of the project was to assess the performance of a reaction vessel by conducting a residence time distribution test using tracer technique. The two scientists have gained valuable substantial experience from this project.
- c) A demonstration on tracer technique was carried out in the sodium hydroxide industry in Surabaya East Java to determine the lost of mercury in an electrolysis cell of sodium hydroxide production. The demonstration was very satisfactorily since the company will gain benefit from this technique namely in the evaluation of mercury requirement without interruption of the on-line process, which will increase the effectiveness of production accordingly.

MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

1. Radioimmunoassay for Hepatitis B Diagnosis

Several clinical RIA laboratories in Indonesia have been equipped with suitable standard and trained staff which have had experience in good RIA practices. Quality control and data processing, have been developed. Several staff have been trained and have particular skill and experience in reagent production. This infrastructure will be a positive support in extending the scope of activity of Hepatitis B diagnosis.

Two staffs from Indonesia (from Hasan Sadikin Hospital, Bandung and Cipto Mangunkusumo Hospital, Jakarta) have been trained on Diagnosis of Hepatitis B using RIA methodology in Beijing, China, March 1991.

Several Hepatitis B kits (HBsAg, anti-HBs, anti-HBc, anti-Hbe and HBe Ag) provided by IAEA have been distributed to several Hospitals/Labs participating in the project to be tried out and be used for studies on several different topics.

Data on the incidence of Hepatitis B following an epidemiological studies in Indonesia has been provided by P3M, Ministry of Health and a survey on the on-going work of Hepatitis B markers by RIA assay or by other methods has also been undertaken.

Kits of Hepatitis B from China provided by the Agency were found to be satisfactorily and the delivery time from Beijing was on schedule.

2. Radiation Sterilization of Biological Tissue Grafts

Institutions where research is being carried out are the Center for the Application of Isotopes and Radiation (CAIR), National Atomic Energy Agency, Jakarta, in collaboration with various big hospitals in Indonesia, namely Ciptomangunkusumo and Fatmawati Hospitals in Jakarta, Sintanala Hospital (Leprosarium)

in Tangerang, Diamil Hospital in Padang and Sutomo Hospital in Surabaya. To support the R & D program 3 surgeons and 2 scientists have participated at the Regional Training Courses sponsored by the IAEA and another 3 surgeons have participated at the same course held in China in 1992.

At present several works on procurement and preparation, storage, mechanical properties as well as microbiological content of freeze-dried radiation sterilized amniotic and pig-skin membranes have been established. Works on the effects of packaging materials and irradiation doses up to 30 kGy on those membranes have also been done. Three scientific papers on those subjects have been published. Works on the effects of procurement and radiation doses on systemic effects of amniotic membranes are still going on, as well as works on the procurement of freeze-dried radiation sterilized AAA-bone (human and bovine). Up to now about 10000 pieces of freeze-dried radiation sterilized of amniotic membranes with the size of 10x10, 10x15 and 15x15 cm have been produced at CAIR and about 5000 pieces of them have been applied as wound dressings for open wound, burn wound and leprosy-ulcers at several hospitals mentioned above with promising results. The rest of the amniotic membranes were used for R & D.

Based on the result of the amniotic membrane application at several hospitals indicated that the establishment of a tissue bank at those hospitals are seriously needed.

AGRICULTURAL PROJECTS

1. Food Irradiation Process Control and Acceptance (RPMI Phase III)

It is evident that irradiation is effective to improve hygienic quality or to extend the storage life of various kinds of foodstuffs. However, this technology is still less recognized by the public. The objective of the project is to promote

commercial application of food irradiation and implementation of the appropriate process control.

The project has entered into the third year program. Research activities done dealing with the detection of free radicals in irradiated food, transportation and quality evaluation studies on irradiated dried anchovies (with People's Republic of Korea) and cost-economic studies on irradiated food.

Some results obtained indicated that free radicals were detected in rice and spice after irradiation, but disappeared after one month storage. The free radicals also disappeared when irradiated product was contacted with water. Beside the activities in the framework of RPHI Phase III, other on-going work on food irradiation are irradiation of vegetables (asparagus, capri beans and bamboe shoots), fruits (mangoes, tomatoes) and sterile food for hospital. Regulatory procedure to support the implementation of the existing food irradiation regulation is now under preparation. The clearance for irradiated frozen shrimps, froglegs, and dried salted fish are now under consideration of the health authorities.

RADIATION PROTECTION PROJEC.S

1. Personal Dosemeter Intercomparison

For routine personal dose monitoring purpose, a single dosimeter placed in front of trunk of the worker is commonly used. In fact this personal dose monitoring system gives only limited information about the dose accepted by the workers. For ideal condition of exposure, it is assumed that dose accepted by dosimeter should reflect a dose value accepted by the body. Intercomparison with other standard laboratory is needed to evaluate and implement the proper personal dose evaluation system.

Three phases of intercomparison activity have been accomplished. The activity started from Phase-1 (1990), Phase-2 (1991) and phase-3 (1992). Intercomparison results have been reported to JAERI and presented at the IAEA/RCA Workshop on Personal Dosimeter Intercomparison at JAERI, Japan, October 26 - 30, 1992.

A summary of the work done seems that the dose evaluation observed by the Centre for Standardization and Radiological Safety Research (CSRSR)-BATAN was 21.7% lower than that of JAERI. (Phase-1), deviation of out-put measurement of calibration sources varied from -0.87 to 4.1 and dose evaluation result varied from 0 to 7.0% by fading correction of 15%. (Phase-2), and deviation of dose evaluation varied from -2.1 to 10%, for the deep dose measurement and varied from 1.2 to -16.7% for skin dose measurement.

2. Reference Asia Man

Among 11 Asian Countries, a decision have been reached that local data on the external and internal anthropological measurement, food consumption, and physiological characteristics, should be compiled for the purpose of establishing the Reference Asian Man. The agreement was established in 1989, at the Mito Meeting.

Surveys which have already done in Indonesia covered some places, namely Jakarta (1989-1990), Flores, East Indonesia (1990-1991), North Sumatra (1991-1992) and was extended (1992-1993). The compilation of these data is expected to give an estimate of the normal characteristics of the Indonesian man.

Rough data have been collected, and are being processed for final report, which hopefully can be finished by April 1993. The report will be sent to NIRS, Japan, while a final Country Report will be formulated by July 1993 as requested by the IAEA.

Total data collected comprised of external anthropological measurement (about 1000 people), internal organ measurement (500 people), food consumption (1000 people), physiological measurement (300 people) and analysis of food items and human tissue.

NEW UNDP/IAEA/RCA PROJECT

First of all my I extend my Delegation's sincere appreciation to the RCA Co-ordinator Dr. John Easey and the IAEA for the efforts done to make our UNDP Project Proposal sound and approved by the UNDP Head Quarters. Therefore my Delegation is pleased to welcome this new project which will be implemented soon. We have confidence that through this new project the transfer of nuclear science and technology will be enhanced in the region.

Environmentally sustainable development is a global issue recently and in the future and will be the concern of all nations in the world. In Indonesia all development programs have to be based on sustainable environment. Nuclear technology is one of the crucial issue used by a group of environmentalists in their campaign and assumed as a serious hazard to the public health and the sustainable environment. And therefore special attention should be given to the application of isotopes and radiation in this respect.

My I take this opportunity to extend my Delegation's sincere appreciation to UNDP, IAEA, the governments of Australia, Japan and Malaysia for financial support of the project. I do also believe that most of the RCA Member countries are in a position to actively sharing in kind contribution to the project.

Let we strengthen our regional cooperation for the successful implementation of this new project as a continuing effort of the previous regional project on the industrial application of isotopes and radiation.

In regard with the location of the coming office for the new UNDP/IAEA/RCA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development, Indonesia has no objection if the meeting will consider to move the existing office in Jakarta to another RCA Member countries. Indonesia has served its obligation since the beginning of the previous UNDP/IAEA/RCA Regional Industrial Project with office space of about 139 sq.m. furnished with furnitures and administrative equipment and personnels (four clerical and typist, and one driver). We are very thankful to the RCA and the Project Coordinators as well as to the longterm experts assigned to the project for their kind co-operation during that period.

SIXTEENTH RCA WORKING GROUP MEETING

My Delegation is pleased to acknowledge the willingness of our government to host the forthcoming RCA Working Group Meeting in 1994 elsewhere in Indonesia. Venue and time of the meeting will be announced later on. Official invitation will be arranged and will be communicated to the RCA Member countries.

JAPANESE COUNTRY STATEMENT
at
THE 15th WORKING GROUP MEETING

MANILA, THE PHILIPPINES

MARCH 1993

Mr. Chairman, Distinguished delegates, Ladies and Gentlemen,

On behalf of the Japanese delegation, I wish to express my congratulations to the Government of the Philippines for its diligent work in planning, arranging and organising this important meeting, and also wish to express my gratitude for its hospitality extended to us all.

Last year the RCA Member Countries witnessed the Extention Agreement come into effect, and Mongolia, which expressed interest last March in Tokyo in joining the RCA activities, became a Party to this Agreement. Japan warmly welcomes Mongolia to the RCA cooperation, and is very pleased to see that we are now a group of the 15 nations with the spirit of mutual cooperation, self-reliance, and understanding with a view to promoting peaceful uses of nuclear science and technology.

Mr. Chairman,

Japan sees the RCA a very serviceable architecture, and is pleased to note the continued progress of the RCA activities. Considering the expansion of uses and applications of nuclear techniques in the RCA countries which has so far brought enormous advantages especially in the fields of industry, medicine and

radiation protection, we should not disregard the importance of peaceful applications of nuclear technology so as to develop economies in and bring social benefits to this region. Japan will therefore continue to support the RCA activities as ever, not only technically but financially, as most important vehicle for cooperation of this kind. And Japan hopes to see continuously the spirit of mutual cooperation, self-reliance, and understanding which has indeed distinguished the RCA as a guiding light for other regional co-operative undertakings, the very fact of which the RCA is so very proud.

On the further development of the RCA co-operation, Japan believes that a successful co-operation depends on picking up promising projects which well correspond to the needs of the RCA Member States on one part, and on the Member States' manifesting self-help spirit on the other. Of course, smooth communication and coordination as we have today should be maintained between the IAEA and the Member Countries. It also seems sound and appropriate to take into consideration the limitation of the RCA finance, if it exists, at the time we consider a new project, and therefore to explore with courage the possibility of employing the principle of scrap and build when it is needed. Bearing those in mind, Japan is eager to continue to extend as much support and contribution to the RCA as possible, with emphasis on the further development of the human resources in the region, as ever, through sending the Japanese experts and receiving foreign experts, with a view to seeing the region further prosper.

Mr. Chairman,

Japan basically supports the Proposed RCA Project Activities for 1993.

As for the RCA budget for 1993, Japan is not in a position to commit itself to a specific amount of contribution. As in the past, however, Japan will technically and financially provide as much support to the RCA in 1993. From

1980 to 1992 Japan provided extra-budgetary contribution of about U.S.\$5,000,000 to the RCA activities.

With regard to the question of financing the RCA project from outside the region, Japan is of the view that a regional cooperation such as the RCA should be carried out for projects of high interests among member countries, based on the principle of self-reliance, and within its own cooperative framework. It is perhaps likely that receiving finance from outside the Member Countries introduces consequently a certain other elements to the RCA's tradition.

In case the RCA budget does not correspond to a very strong willingness of the Member Countries to increase the number or expand the scale of activities, a realistic approach perhaps needs to be adopted. It will be necessary in such a case to consider a possibility of putting some projects with lower priority on the RCA footnote a project list to look for interested donors from the outside, or explore a possibility of RCA's finding alternative multilateral sources of funding.

The RCA practice of appointing national project coordinators for each RCA project is very fitting for effective and efficient implementation of activities within the RCA framework. Japan too have national project coordinators in the fields for which Japan is cooperating, and they have indeed contributed enormously in planning, coordinating, and executing various RCA activities for which Japan is responsible. This practice certainly needs to be continued.

The RCA National Coordinators received from the RCA Secretariat last December a request to appoint a national project coordinator for a would-be IAEA Technical Cooperation project RAS/4/012 (Nuclear Instrument Maintenance for Non-Medical aspects). Japan believes that the proper coordination between the IAEA regional cooperation such as the RCA and the IAEA Technical Cooperation itself is desirable in the light of effective and efficient implementation of

respective cooperative activities with a view to achieving as much outcome as possible. However, it seems rather that the Secretariat's request of last December go somewhat beyond the mandate of the RCA. It is hardly easy to see that the RCA cooperative framework appoints national project coordinators of non- RCA Cooperation framework. Japan therefore requests the RCA Secretariat again to try to reconsider and explore other appropriate measures of coordination such as requesting not through the RCA National Coordinators but through official and usual channel of IAEA Technical Cooperation the appointment of national project coordinators for the project RAS/4/012. Japan reiterates its view that the coordination of the two frameworks is very important, and that it needs to be done with proper and appropriate channels and measures.

Mr. Chairman,

As for the bridging project in 1992 in the field of industrial application, Japan extended its support as much as possible with in mind its belief that this project would hand over the ample momentum to an " Environment Project." For this project Japan contributed about U.S.\$290,000 and dispatched 9 experts to 5 courses.

Japan reiterates on this occasion its support to the realisation of a new UNDP/RCA project proposal titled "the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development," an "Environment Project" to be short. Japan will technically and financially provide as much support to this project as possible like it did for the past UNDP/RCA Industrial Project. From this viewpoint, in 1992 Japan hosted an Expert Advisory Group Meeting for this project proposal.

In order to realise an early implementation of the whole set of this

project, within its own capacity Japan too has worked on the UNDP. It is regrettable, however, to have learnt from the RCA Secretariat that it seems unlikely to reach an final agreement on the UNDP's financial contribution by the middle of this year. The RCA Member Countries would certainly appreciate if the Secretariat could exert on behalf of the RCA Member Countries a bit more of efforts in negotiating with the UNDP for an early implementation. Under these circumstances explanation from the Secretariat would be appreciated on whether we will be having any activities in this field before we hear the final agreement with the UNDP, and if we will have some what the basis and framework of such activities would be since we have only agreed the start of the " Environment Project " activities in 1993.

Mr. Chairman,

With respect to Medical and Biological applications Project Japan will in 1993 extend technical and financial support as possible as before in sub-projects on Imaging Procedures for the Diagnosis of Liver Diseases, Improvement of Cancer Therapy, and Compilation of Anatomical, Physiological, and Metabolic Characteristics for a Reference Asian Man.

With regard to Strengthening of Radiation Protection Infrastructure Japan will in 1993 continue to support this project technically and financially, in light of the importance of nuclear safety in the RCA member states where uses and application of nuclear techniques are expanding. In 1992 Japan hosted 3 meetings in this field, including the Project Formulation Meeting for the Phase II , and dispatched 1 expert to a regional workshop.

As regarding Phase III Food Irradiation Project, Japan ceased its financial support, due to its domestic reasons towards food irradiation, at the completion of Phase I . Japan remains interested, however, in considering in-kind

cooperation on a case-by-case basis to limited aspects of receiving foreign trainees and sending its experts.

As regards Research Reactor Utilisation Project, Japan will continue to extend possible support on a case-by-case basis through, for instance, sending its experts, and accepting foreign researchers and trainees etc, taking into account the RCA financial situation. In 1992 Japan sent 1 expert to a regional workshop.

Thank you, Mr. Chairman.

COUNTRY STATEMENT OF REPUBLIC OF KOREA
15th RCA Working Group Meeting
Manila, Philippines, March 16~19, 1993

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen

It is our great pleasure to participate in this 15th Working Group Meeting of RCA Member States. On behalf of the Korean delegation, I would like to express our gratitude to the Government of the Republic of the Philippines for hosting this meeting and the warm hospitality.

On behalf of the Korean delegation, I am very happy to welcome the delegates from our new participating country, Mongolia, and I am also delighted to welcome new Deputy Director General of IAEA, Mr. Qian Jihui.

Korea has maintained active participation in the various RCA Project over the past years. The summary of activities implemented in 1992 by Korea in relation to the RCA programme is as follows:

1. INDUSTRIAL PROJECT

1.1. Tracer Technology

KAERI tracer team carried out a research project to improve technical capability of the team. Data Acquisition System and Water Flow System which can be used for simulation of various industrial systems were constructed. Using these systems, a series of tracer lab. experiments were conducted and the data were analyzed by the computer simulation programme.

An expert attended at NEMS/DEMO held in Sri Lanka in March 1992 as a Technical Assistance Expert.

1.2. Nucleonic Control System

A lecturer and a participant were dispatched to the Regional Workshop on Nucleonic Control System in Steel Industry held in China in June 1992.

1.3. Non-Destructive Testing

Three engineers participated in the Regional Workshop on Image Processing in Materials Science and in Non-Destructive Testing, India, January 1992. A RTC on Industrial Application of Non-Destructive Testing and Evaluation will be held in October 1993 at KAERI.

1.4. Radiation Technology

The Co-60 Irradiator (70 kCi) and Electron Beam Accelerator (300 keV, 25 mA) have been moved to the new site of KAERI in Taejon and irradiation service will be resumed for various radiation application researches. The commercial irradiation service company (Greenplatech Co.) irradiated 460 ton of medical products from 120 companies in 1991.

For the manufacturing of radiation crosslinked wire and cable, three companies are operating 5 EB machines and two others are waiting for installations. Two EB machines are operating for production of PE form and curing of ink and one other for tire production is under installation.

An expert participated in Expert Advisory Group Meeting on Identification of Radiation Technology Application for Conservation of Environment, held in Japan in October 1992.

2. MEDICAL AND BIOLOGICAL PROJECT

2.1. Radioimmunoassay for Hepatitis B Diagnosis

Bulk reagent based radioimmunoassay technique for Hepatitis B markers was introduced and the team participated in the evaluation of the kit.

2.2. Evaluation of Imaging Procedures for the Diagnosis of Liver Diseases

Korea participated in the comparative evaluation of scintigram and ultrasound imaging and the Scientific Investigator attended at the Final Research Coordination Meeting held in India in January 1993.

2.3. Radiation Sterilization of Tissue Grafts

The project coordinator attended at the Project Formulation Meeting held in the Philippines in August 1992 and two medical doctors participated in the Regional Training Course held in China in September 1992. The establishment of tissue bank with IAEA technical co-operation support is planned as a project in 1993/1994.

2.4. Computer Assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix

The 2nd research report was submitted and the cooperative research contract was renewed for the 3rd year. The Scientific Investigator attended at the 2nd RCM held in Indonesia in December 1992. The use of the PC software for radiotherapy of uterus cancer will be expanded in 1993 and the results of radiotherapy will be analyzed.

2.5. Computers in Tc-99m Imaging

A trainee participated in the RTC on the Use of Computer in Nuclear Medicine held in Australia in March 1992.

2.6. Nuclear Instrument Maintenance

About 130 scintillation cameras are in use in 80 hospitals in Korea. Annual customer meeting is recommended to exchange experiences of maintenance and to obtain new information from makers.

Attended at the 2nd Project Formulation Meeting held in Australia in February 1992 and also at the 1st Task Group Meeting on Regional End-User Union

of Nuclear Medicine Equipments held in Indonesia in October 1992.

3. AGRICULTURAL PROJECT

3.1. Food Irradiation Process Control and Acceptance

Attended at the 3rd Research Coordination Meeting and the Regional workshop held in China in September 1992. A survey on consumer's conception and attitudes on the use of food irradiation technology was carried out and the results were submitted to IAEA. Long term preservation trials of irradiated anchovy between Korea and Indonesia and of dried red pepper were carried out.

Total 17 kinds of food have been approved for gamma irradiation by the governmental authority and the use of E0 gas for the sterilization of spices, etc. was prohibited. The amount of irradiated food was increased by more than 100 percent and recorded about 3,000 ton in 1992.

Final Research Co-ordination Meeting (RPFI-Phase III, 1990~1993) will be held in Daeduck Research Center in September 20~24, 1993.

3.2. New Project Proposal

A new project, Amelioration of Environmental Pollution by of F-1 Sterility for Controlling Caterpillar Pest of Horticultural and Field Corps, is proposed as a coordinated research programme in 1993.

4. RESEARCH REACTOR UTILIZATION AND ENERGY BASED PROJECT

4.1. Research Reactor Utilization

An engineer participated in the RTC on Safety Documentation of Research Reactor held in Bangladesh in October 1992 and two scientists participated in the RTC on Materials Characterization held in China in October 1992. The coordinator attended at Regional Workshop on Neutron Transmutation Doping Technology held in China in October 1992.

4.2. Nuclear Power Planning and Manpower Development

A RTC on Non-Destructive Testing and Evaluation of Nuclear Power Plants was held at KAERI, and 10 participants from 8 member countries were trained. Two scientists participated in the RTC on Electric System Expansion Planning held in Pakistan in April 1992.

5. RADIATION PROTECTION PROJECT

5.1. Strengthening of Radiation Protection Infrastructure

Attended at the Project Formulation Meeting for the 2nd Phase held in Japan in June 1992 and at Regional Workshop on the Development of Training Techniques and Methods of Instruction in Radiation Protection held in Australia in February 1992. This project is included in the Korean Long-Term Atomic Energy R & D Plan and Korea will actively participated in this project.

I am pleased to note that Korea has taken great benefit through various RCA activities during past years. Korea will actively participate in the RCA Projects for the benefits of our country and the region.

I would like to express our thanks to the host, the government of the Republic of the Philippines, for their kind hospitality and the excellent arrangements made for this important meeting.

Thank you.

**Country Statement of the Malaysian Delegation
of the 14th RCA Working Group Meeting,
16-19 March 1993 Manila, Philippines**

Mr. Chairman,
Distinguished Delegates,
Ladies and Gentlemen

First and foremost, let me express the Malaysian Delegation's gratitude to the Government of the Philippines for kindly hosting this meeting and for the excellent arrangements made. We wish to thank the Organizers for accommodating the request of the Muslim participants to change the date of the meeting so as not to coincide with the important Muslim event of Eid.

1992 has passed by rather quickly and a number of important events have taken place in spite of some constraints, in particular the not so favourable financial situation of the IAEA. The successful implementation of last year's programmes is attributed to the untireless efforts of the RCA Co-ordinator and his staff together with support of the relevant departments of the Agency. The sincere commitments of RCA Member States demonstrated through their support both financially and in-kind contribution as well as through their active participation in the RCA activities have greatly contributed to the success of the 1992 activities. I wish to reiterate that the Government of Malaysia firmly believes that the RCA is one of the most effective arrangements for nuclear technical cooperation and for the promotion of technical cooperation between developing countries.

Mr. Chairman, Ladies and Gentlemen.

Let me now report on some of the activities that took place in 1992 in Malaysia within the scope of the RCA programme and areas related to it.

1. Industrial and Environmental Project

The successful implementation of Phases I and II of the RCA/UNDP Industrial Project have led to several significant results especially in the development of expertise in the related fields and greater utilization of nuclear techniques by the industry.

In the field of Non-Destructive Testing (NDT), a concerted effort by the Nuclear Energy Unit, the Standards Industrial Research Institute of Malaysia and the National Vocational Training Council in the implementation of the National Qualification and Certification of NDT Personnel has produced about 200 certified NDT Personnel since 1986. With the rapid increase of NDT application by the various sectors of the Malaysian industry, greater efforts are being undertaken now to increase

the number of training courses and examinations to meet the requirements of the industry. The procedures developed by the International Standards Organization has been adopted for the Malaysian Certification Scheme.

New areas of NDT applications are being pursued, in particular applications for non-metallic materials. In this connection, a National Seminar on NDT for Non-Metallic Materials was held in December 1992. Malaysia also hosted a Proficiency Testing Programme Evaluation for NDT on 11-18 August 1992, the results of which will be made known this year.

Another subject under the Industrial Project that is gaining in importance in Malaysia is the Use of Tracer Techniques for Sediment Transport and Effluent Discharge Studies. The core group of trained personnel at the Nuclear Energy Unit has been called upon to assist port authorities in the optimization of dredging operations as well as in solving problems related to siltation of ports and tidal estuaries. The Malaysian Government is encouraged with the recruitment of two Malaysian experts for a project on the study of Flow Behaviour of the waste Water Treatment Plant in the Philippines conducted on 27 September - 16 October 1992. We would suggest that activities with elements of TCDC be further enhanced.

In the area of radiation technology, some encouraging developments that took place in 1992 include the announcement by two private companies to construct gamma irradiation facilities for the main purpose of medical product sterilization. The potential of Radiation Vulcanization of Natural Rubber Latex (RVNRL) is also being recognized by the relevant industry. In our efforts to demonstrate the feasibility of RVNRL and to promote its exploitation, the Nuclear Energy Unit would be constructing a pilot plant for RVNRL.

2. Medical and Biological Applications of Nuclear Techniques

Malaysia participates in four projects in the field of Medical and Biological Applications of Nuclear Techniques.

With respect to the project on 'Radioimmunoassay for Hepatitis B Diagnosis', the reagents received were used mainly for the study of hepatoma patients, antenatal pregnant mothers, post vaccination subjects, screening of subjects in the campaign for screening of and vaccination against hepatitis B and screening of blood products and the study of borderline positive cases. We are currently looking into the possibility of producing part of the kit component locally and with some assistance from the IAEA to carry out iodination of the antibody in bulk for IRMA. Our ultimate aim is to produce monoclonal antibody.

Under the project on 'Radiation Sterilization of Tissue Grafts', some work has been initiated on keratinocytes culture in addition to the work on amniotic membranes. The Nuclear Energy

Unit is providing assistance to the National University of Singapore in the sterilization of bone grafts.

The upgrading of capabilities in the maintenance of Nuclear Medicine instrumentation continues to be pursued through training courses and demonstrations. Malaysia hosted a Regional Consultants Workshop on Utilization and further Modification of Preventive Maintenance (CMPM) on 7-11 September 1992.

3. Agriculture and Food

Under the CRP on the 'Use of Isotopes in the Studies to Improve Yield and Nitrogen Fixation of Common Grain Legumes", two field experiments were conducted in 1992 and the final stage screening of six promising mutant lines was carried out at two levels of nitrogen application namely, 20/kg N/ha and 100 kg N/ha.

In the field of Food Irradiation, Malaysia is emphasising on the use of radiation for quarantine purposes.

4. Radiation Protection

The Personal Dosimetry Intercomparison activity under the 'Strengthening of Radiation Protection Infrastructure' project was completed as scheduled. The SSDL of the Nuclear Energy Unit tested the performance of the dosimeter system using the new ICRU operational quantities. In general, the results indicated that the performance of our dosimetry system is comparable to those in other member states with deviation within the acceptable range recommended by the ICRP and IAEA.

5. Research Reactor Based Project

Malaysia was not able to participate actively in the Research Reactor Based project in 1992 due to manpower constraints. However, we wish to reiterate our support for this project and we expect to participate more actively in the years to come.

In closing, let me state that Malaysia has greatly benefited from the various activities under the RCA programme. I wish to reiterate our firm believe that RCA has and will promote the strong linkages between member states in the peaceful exploitation of atomic energy and we will continue to give our full support now and in the future.

COUNTRY STATEMENT - PAKISTAN

FOR

15TH RCA WORKING GROUP MEETING,

MANILA, PHILIPPINES

16 - 19 MARCH, 1993

Pakistan has been associated with the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) since its inception. RCA has completed 20 years of its successful existence and has proven to be a valuable link between the IAEA Member States of South East Asia and the Pacific. Pakistan believes that RCA will continue to play a useful role in promoting peaceful uses of atomic energy in industry, agriculture, biology and medicine.

Pakistan is actively participating in almost all of its activities and has benefitted from them either by way of training, participation in working group meetings, workshops, seminars, or by undertaking a number of research contracts with the IAEA under the RCA programme. Pakistan has agreed to the extension of RCA Agreement for a further period of 5 years from 1992-97. We are happy to participate in the 15th Working Group Meeting of RCA Member States being held at Manila, Philippines and look forward to continue increasing role of RCA in the Region.

I would now like to discuss the activities carried out during 1992 under the RCA:

A. UNDP/RCA REGIONAL PROJECT ON INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY

The Phase-II of the Regional Project on Industrial Applications of Isotopes and Radiation Technology has been completed. It is a matter of satisfaction that the objectives set forth for the Phase-II of this

project have been generally achieved to the desired level. During 1992, following progress was made in different sub - projects:

(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) and more than 40 organizations in the public and private sectors have benefitted from various courses in NDT in Ultrasonic Testing, Surface Methods and Radiography Testing. During 1992 four level-1 courses were organised in Islamabad. They are as follows;

- Course on Ultrasonic Testing from 1-13 February, 1992. 14 participants attended the course. Out of these 13 passed and were awarded certificates.
- Course on Surface Methods from 18-30 April, 1992. 15 participants took part. Out of these 11 qualified in Penetrant Testing and 14 in Magnetic Particle Testing and were awarded certificates in respective techniques.
- Course on Eddy Current Testing from 12-23 September, 1992. All the 13 participants qualified and were awarded certificates.
- Course on Radiographic Testing from 14-26 November, 1992. Out of 12 participants 8 qualified and were awarded certificates.

All these courses were held in accordance with the times schedules and syllabi given in Document No.PAEC/SES/NDT-001 which in turn is based on IAEA TECDOC-628.

Efforts are being made to launch a professional body solely devoted to NDT in Pakistan. It is hoped that the NDT area would receive further support from the RCA.

(2) Radiation Technology

Following are the RCA activities in the field of the radiation technology carried out in the preceding year:

- A polymer processing laboratory has been set-up. Facilities of TGA (Thermogravimetric analysis), DSC, infrared spectrophotometer for analytical purposes also exist at PINSTECH, Islamabad. The polymer laboratory has extended technical help to solve the compounding problems of masterbatches supplied by AEI and Union Carbide to cable firms. The optimum conditions in terms of RPM, run time and percentage concentration of crosslinking agents have been investigated. Two technical reports have been published to impart know-how to cable companies and collaborating institutes about quality control of crosslinked products and formulation.
- R&D work for PARAS, Lahore in the field of radiation sterilization of medical disposables has been underway. Facility is being extended to include irradiation of food for which R&D work will be undertaken.
- National Co-ordinator attended "Expert Advisory Group Meeting on "Identification of Radiation Technology Applications for Conservation of Environment" at TAKASAKI, Japan from 26 to 30 October, 1992. One senior scientist also visited the Institute for Applied Radiation, Changchun, People's Republic of China from 15 June to 14 July, 1992 under IAEA Technical Co-operation Project PAK/8/009.

(3) Tracer Technology

The activities under Tracer Technology included application in paper industry, overall density profile of the critical portion of a refinery atmospheric distillation, build up and wear measurement in pipelines, etc., as detailed below:-

- Study of Radioactivity Movement from Radioactive Waste Storage Pits

Radioactive wastes of PINSTECH laboratories and reactors are retained in various storage tanks/pits for ultimate disposal. Different counting systems for monitoring radioactivity in the six bore holes have been utilized. Radioactivity was monitored at the end of various seasons

for the last two years. Analysis of the latest monitoring set has also revealed that apparently there was no movement of radionuclides from the solid or liquid waste storage tanks.

- Leakage Investigation in an Underground Pipe line System Using Radiotracer Technique

Work on leakage detection in the underground pipeline of a fire hydrant system has been initiated. Fabrication of a suitable injection system for tracer is in process. A metal detector has been used to locate the exact position of the underground pipe line of the fire hydrant system. Preparation of suitable radioactive tracer is also in progress.

- Study of Void Fractions in a Two Phase Flow System

The void fraction in a two phase flow system would be studied with a gamma density guage. Design of the guage is in progress. Preliminary selection of radiation source has been done. Arrangement of the source will be done in the near future. Collimation arrangement has been finalized. The system will help in the investigation of the behaviour of voids and fluids under various operation conditions.

- Up-gradation of Radioisotope & Radiotracer Application Laboratory

In order to enhance the efficiency, capability and facilities of radioisotopes/radiotracers applications laboratory at PINSTECH, work has been done to overcome some deficiencies due to old counters and detector systems. In this regard, two new radiation monitoring sets (field ratemeters) have been received under IAEA programme of technical cooperation for UNDP/IAEA/RCA Regional training course.

- Visit of IAEA/RCA Coordinator

The RCA Coordinator Dr. John F. Easey visited PINSTECH, Islamabad and NIFA, Peshawar in connection with a project on termite studies using radiotracer technique. This project will be executed by NIFA whereas PINSTECH will participate by providing help on technical aspect especially for the operation of radiation equipment. PINSTECH will also train the manpower.

- Strengthening of Radiation Protection Infrastructure

Work is in progress with the collaboration of IAEA/RCA to strengthen the radiation protection infrastructure in the country. In this regard data collection on physical parameters e.g. height weight, chest and head circumference were carried out for all age groups ranging from 5-50 years. During this period data of 11000 males/females were collected from various ecological areas of Pakistan and stored on floppy diskette. Evaluation for average height, weight, chest and head circumference in the age range of 5,10,15, & 20-50 years for males and 5,10, 15 & 16-51 years for females will be made as soon as software is received from IAEA for the statistical analysis of data. Data on food consumption for reference Pakistan man was also being determined. More data collection is in progress.

One scientist participated in the Regional RCA Workshop on the Development of Training Techniques and Methods of Instruction in Radiation Protection held in Sydney, Australia from 17-28 February, 1992. Project counterpart participated in the Project Formulation Meeting of the RCA Project in Strengthening of Infrastructure for Radiation Protection Phase-II for the period 1993-97 held in Tokai Mura, Japan from 22-26 June 1992. He presented the country status in the field of radiation protection practices being carried out in Pakistan. An overview of the projects status already carried out during Phase-I was also presented in this meeting. During this meeting the current activities of radiation protection in this region were reviewed and then the programme activities of the end phase (Phase-I) of the projects were also discussed according to nine categories of fields; i.e., Industries, Nuclear Applications, Medical Applications, Regulations Reference Asian Man, Off site Emergency, Internal and External Dosimetry Training and Mining and Milling. As a result, the Advisory Group formulated a document on Radiation Protection Phase-II (1993-97) in which recommendations of the proposed projects to be carried out during 1993-97 were given. In response to IAEA request, PAEC is considering for hosting Training Course/Expert Group Meeting in the field of Calibration

in Dose Assessment, Calibration Procedures and Dosimetry Aspects of Medical Irradiation proposed in IAEA/RCA Formulation Document Phase-II, which may be highly valuable for strengthening of radiation protection activities in our country.

New Project Proposal from Australia

The Australian proposal for the RCA Project on Application of Isotopes and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine is composed of 3 segments namely, Industry, Industrial Radiation Protection and Nuclear Medicine. This project proposal is an interlude between the recently completed UNDP Regional Industrial Project and the proposed new UNDP/RCA Project. Pakistan fully supports the Australian proposal and is interested to participate in this programme.

B. Medical and Biological Applications of Nuclear Techniques

1. Radioimmunoassay (RIA) of Thyroid Related Hormones

All the major objectives of the Project on Radioimmunoassay (RIA) of Thyroid Related Hormones have been completed. Pakistan was identified as one of the countries for the supply of RIA reagents in the region for coordination in EQAS. A new advanced software being developed at INMOL, Lahore for EQAS data processing is being made available to the Agency for distribution to EQAS coordinating centres in the region. This project has resulted in significant reduction in the cost per test and the establishment of sustainable regional capability for production of many of the reagents.

2. RIA for Hepatitis B Diagnosis

Pakistan is participating in this RCA project for Diagnosis of Hepatitis B with Radioimmunoassay. Kits and instrument received from IAEA have been distributed to four laboratories in the country

participating in this project. A senior PAEC scientist participated in IAEA Research Coordination Meeting on Radioimmunoassay for Hepatitis B Diagnosis - Development of Enhanced Training Materials held in Jakarta and Bali from 30 October to 1 November, 1992. Two senior scientists will also attend Regional RCA Training Course on the Preparation of Basic Reagents for the RIA of Hepatitis B Markers scheduled to be held in Beijing, People's Republic of China from 26 April to 16 May, 1993.

3. Maintenance of Nuclear Medicine Instruments

As regards the project on Maintenance of Nuclear Medicine Instruments, it is important to consider the spare parts services, upgradation of these instruments, information exchange, and conversion of analogue gamma cameras to digital operation using PCs. Pakistan would welcome the idea of having second-hand scintillation cameras which have been refurbished and upgraded. A senior scientist participated in the Second Formulation Meeting on Maintenance of Nuclear Instruments held in Sydney, Australia from 24-28 February, 1992. Another senior scientist participated in IAEA Regional Training Course on the use of Computers in Nuclear Medicine held in Sydney, Australia from 9 March to 16 April, 1992. A senior engineer also attended the Workshop on Utilization and further Development of Computerised Management of Preventive Maintenance held in Kuala Lumpur, Malaysia from 7-11 September, 1992.

4. Immunoscintigraphy using Tc 99m Labelled Anti CEA Monoclonal Antibodies for Detection of Colorectal Cancer

The anti CEA antibody was successfully labelled at INMOL, Lahore. Radiopharmacy and Immunoscintigraphy was performed in 2 normal persons and 12 patients with suspected or recurrent colorectal cancer. Images were taken in anterior and posterior views of the thorax, abdomen and pelvis. In addition to this blood samples were taken before antibody administration for determining CEA levels in blood and for antimouse antibody (HAMA). The value of immunoscintigraphy in diagnosing recurrent and suspected colorectal cancer was assessed in individual cases.

5. Radiation Sterilization of Tissue Graft with Emphasis on Clinical and Sterility Quality Assurances Criteria

A Senior Medical Officer participated in the IAEA Regional RCA Training Course on Radiation Sterilization of Tissue Graft with Emphasis on Clinical and Sterility Quality Assurances Criteria held at Taiyuan, People's Republic of China from 1-12 September, 1992.

6. Advanced Brachytherapy Techniques for Cancer Management

Pakistan is interested to participate in the important project proposal on Advanced Brachytherapy Techniques for Cancer Management. This Coordinated Research Project was floated by Japan at the 14th RCA Working Group Meeting and it was anticipated that it will be a global CRP in which there will be 10 research projects and 10 agreements. We would appreciate execution of the project at the earliest.

C. 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 for which an IAEA expert visited Pakistan in May, 1992. The Agency is requested to consider provision of a commercial demonstration irradiator to Pakistan.

1. Food Irradiation Process Control and Acceptance (RPFI-III)

Experiments were conducted under the IAEA Research Contract on enhancing shelf-life of potatoes and onions, and decontamination of spices and poultry meat. A Research Co-ordination Meeting on the Asian Regional Cooperative Project on Food Irradiation with Emphasis on Process Control and Acceptance (RPFI-Phase-III) held at Beijing, People's Republic of China from 21-25 September, 1992 was attended by the Principal Investigator.

2. Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen

For the project on Improvement of Grain-Legume Rhizobium Symbiosis, it is suggested that studies on ecology of rhizobia and soil microflora using biotechnological tools as an important area be considered in the future. The new National Institute for Biotechnology and Genetic

Engineering (NIBGE) has started functioning at Faisalabad since January, 1992. Pakistan offers to provide training to the scientists from the region in relevant fields through TCDC.

3. New Project Proposals

Pakistan is interested to participate in the following 3 new project proposals:

- a) Use of Sterile Insect Technique to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies.
- b) Amelioration of Environmental Pollution by F-1 Sterility for Controlling Caterpillar Pests of Horticulture and Field Crops.
- c) Banana Improvement in Asia: Integration of Mutation and related technologies into Conventional Breeding.

D. Research Reactor Based Projects

Research Reactor Utilization

As regards the project on Application of Personal Computers to Enhance the Operating and Management of Research Reactors, a personal computer-based system has been developed for specialised information on radiation data from radiation monitoring channels installed at various locations in the reactor building of PARR-I at PINSTECH. An engineer participated in the IAEA Regional (RCA) Training Course on Measurement of Basic Parameters of Research Reactor held at Serpong, Jakarta from 3-21 August, 1992. A senior scientist participated in the Regional RCA Workshop on Neutron Transmutation Doping Technology held in Beijing, People's Republic of China from 5-10 October, 1992. Another engineer participated in the IAEA Regional RCA Training Course on Safety Documentation of Research Reactors held at Dhaka, Bangladesh from 12-23 October, 1992. Two scientists also participated in the IAEA Regional RCA Training Course on Material Characterization using Low & Medium Neutron Flux Reactors held in Beijing, People's Republic of China from 26 October to 13 November, 1992. Pakistan would like that emphasis be given to experiments on material structure examination and investigation of micro-structure defects in reactor material. Programme for study on the stress and texture of materials be initiated to solve the problems by Industry.

E. Energy Based Project

Energy & Nuclear Power Planning

A six week regional RCA Training Course on Electric System Expansion Planning was organised at Lahore, Pakistan from 26 April to 4 June, 1992. The local sponsors for this activity were: Pakistan Atomic Energy Commission (PAEC) and Water & Power Development Authority (WAPDA). The course was attended by 22 participants from 8 RCA Member States and 7 additional observers from Pakistan. On the request of the Agency, PAEC provided the services of one of its experts for four weeks to undertake the lecturing assignments and supervise various work sessions. Besides contributing towards strengthening the electric system expansion planning capability of the member countries, the course also proved to be very helpful in providing an opportunity to power system planners in these countries for mutual exchange of their experiences. It is strongly felt that this regional training activity should be continued in future as well.

F. Radiation Protection Projects

Under the Ordinance, the Directorate of Nuclear Safety & Radiation Protection of the Pakistan Atomic Energy Commission has been assigned the regulatory function on aspects of nuclear applications in the country which applies also to medical uses of radioisotopes and X-ray machines.

Pakistan is interested in participating in the following 3 new project proposals:

- (i) Survey and Control of Exposures in High Natural Background Radiation Areas,
- (ii) Radon Exposures in Occupational Work other than in Uranium Mining
- (iii) Training in Radiation Protection in the Mining and Milling of Radioactive Ores.

Pakistan has proposed to the Agency to host a Worksnop on Radon Measurements for Dosimetry and Study of Geophysical Processes at Lahore (Pakistan) from 15-22 November, 1993. The Agency has been requested to provide 50% of the total estimated expenditure of US \$ 42,500.

At the 14th RCA Working Group Meeting, the Pakistan delegate had proposed the inclusion of a project on Nuclear Information under RCA. It was emphasised that this project can play a significant role in regional cooperation in the field of Information Exchange based on INIS System. This proposal was supported by other delegates. Pakistan has already submitted a detailed proposal to the RCA Coordinator in October, 1992. This may be included in future RCA programme.

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 would like to continue this cooperation 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 of the Region 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 with the implementation of various RCA activities and has great desire to further promote regional cooperation in peaceful uses of nuclear energy. On behalf of Pakistan, I would like to thank the Government of the Philippines for hosting 15th RCA Working Group Meeting and we look forward to continue cooperation under RCA.

PHILIPPINES COUNTRY STATEMENT
15TH RCA WORKING GROUP MEETING
16 - 19 MARCH 1993, MANILA, THE PHILIPPINES

It is with great pleasure that the Philippines is hosting this 15th RCA Working Group Meeting. We would like to express again our warm welcome to each and every delegate and we hope that this Meeting will be as successful as those in the past years.

We wish to express appreciation to donor countries in the region without which the RCA would not have achieved much of its accomplishments. We hope that they will continue and increase their support to the RCA Programme. I am pleased to inform that the Philippines has made a very modest contribution to the RCA in the amount of P60,000. We are confident that we will have more donor countries in the future as the other economies in the region matures.

At this point, allow me to highlight our participation in the different projects:

1. REGIONAL UNDP INDUSTRIAL PROJECT

1.1 TRACER TECHNOLOGY IN INDUSTRY

A tracer demonstration experiment planned under a technical co-operation project (PHI-8/015) and conducted in September-October was granted support from the RCA project on Industrial Applications and the TCDC.

Assistance on the following were obtained:

1. Expert assistance - Mr. William Wiblin (one week), Mr. Tom Kluss (one week), Mr. Roslan M.A. (two weeks) and Mr. Zainuddin O. (two weeks).
2. Equipment from ANSTO and UTN loaned to PNRI for use during experiment.
3. Tracer (Tritium and ⁹⁹Mo-^{99m}Tc generator and other supplies).

1.2 RADIATION TECHNOLOGY

a. RADIATION STERILIZATION

1. PNRI and BFAD are working together towards the setting up of regulations on radiation sterilization.
2. PNRI has finished the final draft of rules and regulations on the licensing of gamma irradiators.

b. RADIATION CURING

1. A 2-week expert mission on UV curing (November 15-27, 1992) and some chemicals for UV curing of wood surface coating were obtained from IAEA. During the expert mission, a one-day lecture/workshop on radiation curing of surface coatings was held at Forest Products Research and Development Institute. A total of 64 participants (from wood products/furniture industries, research institutes and universities) attended the said lecture/workshop.

c. RADIATION VULCANIZATION OF NATURAL RUBBER LATEX

1. An expert mission on radiation vulcanization of natural rubber latex (November 9-20, 1992) was obtained under IAEA TC project PHI/8/013. During this mission, a national consultative meeting on RVNRL was held. Twenty five participants from the rubber industry, universities and research institutions attended the meeting.

d. UPGRADING OF THE MULTIPURPOSE GAMMA IRRADIATION FACILITY

1. The source of the multipurpose gamma irradiation facility was upgraded with an additional 50 kCi Co-60 through IAEA TC project PHI/8/013.

Instron, data module for HPLC, etc. were also granted under the TC project. These are used for R and D on applications of radiation processing.

1.3 NON-DESTRUCTIVE TESTING

Seven national training courses were held in 1992, namely: UT Level 2, 2 RT Level 2, UT Level 1, SM Level 2, RT Level 3 Trainers Course and UT Level 2. A total of 111 participants attended the above-mentioned national training courses. The RT level 3 Course was conducted with IAEA assistance in the presence of an expert, Mr. Roy Gilmour. For 1993, eleven (11) national training courses on the following have been scheduled: RT Level 2, UT Level 2, RT Level 3, UT Level 3, RT Level 1, SM Level 2 and ET Level 2.

The National Certifying Body conducted several Certification Examinations on UT and RT Levels 2 and 3 in 1992. For 1993, 3 more Certification Examinations for all NDT Techniques and levels are scheduled.

2. MEDICAL AND BIOLOGICAL APPLICATIONS

2.1 QUANTITATIVE EVALUATION OF NUCLEAR MEDICINE IMAGING PROCEDURE FOR THE DIAGNOSIS OF LIVER DISEASES/PHASE II

The present study aims to undertake a comparative analysis of imaging modalities for liver diseases, particularly nuclear medicine and ultrasound.

QA/QC test results of nuclear medicine and ultrasound imaging equipment were collected from participating institutions and sent to IAEA for analysis and evaluation. Ultrasound and nuclear medicine images were sent by Japan and interpreted by local specialists, results of which were sent back to Japan for analysis and evaluation.

2.2 RADIOIMMUNOASSAY FOR HEPATITIS B DIAGNOSIS

Four hospitals are participating in this project which commenced in the latter part of 1991 with PNRI as the co-ordinating laboratory. RIA kits from PANAVITA and the China Institute

of Atomic Energy have been tested until September 1992. These reagents are subsequently being used for the assay of patient specimens coming from different groups, e.g. hospital workers, pregnant mothers, infants of infected mothers, walk-in patients and in immunogenicity studies.

Problems encountered include late arrival of the RIA kits, sometimes almost on expiry date, resulting in poor reproducibility of assay results. Also, each participating laboratory is not individually provided with autobead washers so that one laboratory has to wait for another laboratory to complete its assays before it can proceed to do its own assays.

2.3 INHALATION IMAGING FOR DIAGNOSIS OF RESPIRATORY DISEASES

Normal healthy volunteers were included in the study. All of the subjects are residents of the city for the past few years, non-smokers, with no known respiratory symptoms or lung diseases, and have normal chest X-rays and spirometric lung function tests. Air quality (pollution) data including annual mean figures for the concentration of air pollutants, such as sulphur dioxide, nitrogen dioxide, suspended particles, particulate pollutants and carbon monoxide, were obtained for late correlation.

Technetium 99m-DTPA lung clearance study was performed in these subjects according to previously established protocols. Freshly prepared DTPA labelled with 15 mCi of Tc 99m in one ml volume was nebulized using the BARC aerosol done for 3-5 minutes and continuous lung recording in the posterior view obtained with a Siemens Orbiter gamma camera interfaced to a MicroDelta computer. Data collection was carried on for 15 to 20 minutes. Retention images were obtained after 20 minutes.

After delineating the region of interest in the lung field, a time activity curve was generated. Subsequently, exponential curve fitting of the disappearance slope, mainly for seven minutes from maximum (C_{max}) was done. Half-life ($T_{1/2}$) of Tc 99m-DTPA clearance was determined, and serves as the index of the lung permeability function.

2.4 RADIATION STERILIZATION OF TISSUE GRAFTS

The Project Formulation Meeting on this topic was held in Manila on 3-7 August 1992. Sixteen participants from 10 Member States participated in the Meeting. The Meeting reviewed the current progress of the different projects on tissue banking. It also discussed the state-of-the-art practices and protocols followed by the different regional countries. Discussions centered on the following areas: a) dissemination of information b) quality control (good manufacturing practice) c) exchange of samples d) research and development and e) training.

In the Philippines, clinical utilization of radiation sterilized grafts (amnions and bones) are gaining wide acceptance. From June 1990 to July 1992, we have used the bone allografts with good success in 27 cases. There are various plans to expand the processing of tissues aside from amnion and bones by including tendons and ligaments which are frequently being utilized in other hospitals. The cost considerations for possible commercialization of different tissues in the country is being studied.

2.5 RADIATION THERAPY

The project aims to develop the most practical protocol for cancer of the cervix consistent with locally available resources and to perform a comparative analysis of the dose calculations using a dedicated computer available in the hospital.

The study included 27 patients with histopathologically confirmed CA of the cervix in stage II-B to III-B. External beam therapy was done using Co-60, 4 Mev LINACS while intracavitary irradiations were performed using both HDR and LDR Selectrons with Ir-192 and Cs-137 sources, respectively. TLDs were used for in-vivo dosimetry of the bladder and rectal points.

Results of measurements indicate that values using comp 1 (A & B) and comp 2 are within + 20%. The use of commercially available software as compared to manual calculations, computerized treatment planning using mini as well as PC-based systems is much more desirable in terms of convenience and efficiency of dose calculations. Moreover, the software provided by the IAEA has adequately addressed two serious limitations of existing computers in the hospital, i.e., no provision for summation of dose distribution of teletherapy and intracavitary plans and lack of programmes for patient registry.

Further study will be undertaken to further optimize the dose and to minimize complications to patients. Follow-up of patients included in the study will be pursued and more detailed evaluation and analysis of data will be performed to correlate treatment volumes with treatment response.

2.6 CARE AND MAINTENANCE OF NUCLEAR MEDICAL EQUIPMENT

Quality control tests on gamma cameras and other nuclear medicine instruments of hospitals were performed and seminars and lectures were conducted for technologists, nuclear medicine practitioners and physicists. The audiovisual kits that were sent by the IAEA to all participating national centers were received and used in the conduct of the lectures and seminars.

Acceptance testing for one of the new gamma camera systems in country was already initiated.

3. RADIATION PROTECTION INFRASTRUCTURE

The Philippines has participated in both the 1st and 2nd Project Formulation Meetings held in Japan in 1987 and 1992, respectively, and has actively taken part in the activities identified by the RCA Member States to further strengthen the radiation protection infrastructure in the region. Two sub-projects were subsequently pursued, namely: Intercomparison of Personal Dosimeter and the CRP on Reference Asian Man Project.

3.1 PERSONAL DOSEMETER INTERCOMPARISON

The intercomparison program was carried out in three phases during 1990-92. Two types of personal dosimeters were submitted by participating countries. The Philippines submitted film dosimeters as this is the type used in our national personnel monitoring service which is being run by the Philippine Nuclear Research Institute for the past twenty-five years or so.

The intercomparison program was conducted both in free air and on-phantom irradiations. It also allowed a field reference value check after it was noted that there might be

a significant difference among the reference exposure value of each participant's irradiation field thus affecting the dose evaluation results.

Results of the intercomparison show that most personal dosimetry systems have reasonable accuracy in measurement of "exposure". The accuracy of the results has improved through the three phases of the programme. The opportunity to discuss with counterparts in the region proved to be very useful.

The adoption of the ICRU operational quantities $H_p(10)$ was discussed during the last phase of the intercomparison. Two irradiations were carried out on phantom to evaluate the quantity dose equivalent $H_p(10)$. The results seem to indicate a marked difference between TLD and film which is attributed to be mainly caused by a misinterpretation of the new ICRU concept and the wrong dose evaluation algorithm. In view of this, there was an overwhelming expression of support among the RCA countries who participated in the intercomparison to continue the programme to further improve the accuracy of measurements and to confirm an internationally agreed quantity and dose estimation method for personal monitoring.

3.2 REFERENCE ASIAN MAN

The CRP on Reference Asian Man has three components, namely: anatomical, physiological and dietary characteristics. Results of measurements in the Philippines have been reported in the last co-ordination meeting held in Bombay, India. There are standard height and organ masses of male and female Filipinos by age group; the mean height and weight of Filipinos by sex and age taken from Food and Nutrition Research Institute nationwide survey conducted in 1987 and results of water balance studies conducted on male and female Filipinos.

Dietary surveys were conducted in 24 provinces and calculations of nutritional intake by age and sex using developed computer programs is currently being undertaken. Further collection of anatomical and physiological data will be undertaken even outside of the present CRP.

4. AGRICULTURAL PRODUCTS

4.1 FOOD IRRADIATION PROCESS CONTROL AND ACCEPTANCE (RPR III)

Results of the study on "The Use of Gamma Irradiation for Enhancing the Marketability of Selected Seafoods and Agricultural Crops" confirmed that lowering the dose level of irradiation to the minimum of 1.2 kGy required to destroy *Salmonella* did not eliminate the "burnt" odor and flavor in irradiated frozen prawns but significantly minimized the occurrence.

The "irradiation" odor and flavor at 1.2 kGy was judged perceptible but acceptable to the trained panelists. The off odor and flavor during irradiation was masked when the irradiated product was cooked using common recipes for prawns in the Philippines.

This study also showed irradiation at 1.2 kGy could still control the total microbiological population in frozen seafoods and could effect one to two log cycle decreases in the total aerobic plate count.

Evaluation of the surviving microbial flora of irradiated and non-irradiated prawns during storage showed that irradiation reduced staphylococcus and proteolytic bacteria. For all trials the increased shelf life of the irradiated samples can be ascribed to lower initial microbial counts of the four (4) groups of microorganisms studied namely: APC, Enterobacteriaceae, Proteolytic and Sulfide Reducers.

The major spoilage microorganism in the irradiated frozen product were micrococcus and staphylococcus.

During chill storage at 0-2 C, gram (+) bacteria like *Brochotrix thermospacta* and *Lactobacillus* predominated. These microorganisms would be expected to be responsible for the eventual spoilage manifested as souring of the irradiated product. The growth of these microorganisms was due to the packing of the chilled shrimps in polyethylene (PE) bags. Species survival during storage was not related to irradiation but to the sensitivity of species to temperature and CO_2 accumulating in the package.

4.2 IMPROVEMENT OF GRAIN LEGUME RHIZOBIUM SYMBIOSIS TO FIX ATMOSPHERIC NITROGEN

Five varieties each of good nitrogen-fixers and high yielders (recommended cultivars) have been identified as a result of the screening activities. Hybridization work between high yielding recommended cultivars and varieties with good biological fixation potential was started in October 1992. Five varieties each of good N-fixers and high yielders were used as males and females, respectively, to make 25 cross combinations. A sufficient number of F1 seeds have been produced from each of the 25 cross combinations.

Screening for groundnuts (peanuts) for enhanced nitrogen fixation was started in November 1992. Nineteen genotypes and three reference crops were used in this experiment.

Future activities will be backcrossing of the F1 plants to the recommended cultivars will be done prior to generation advance, residual experiment on groundnuts and pot experiment on groundnut using acid soil.

5. RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS

5.1 RESEARCH REACTOR UTILIZATION

The project obtained six sets of interface cards in 1991-92. With the acquisition, the project now has all the major hardware items needed to complete the project. Of the hardware, only the opto-isolation circuits for the serial interface between PCs remain unavailable. These are not commercially available at reasonable cost and must be fabricated by the project. The circuits are not complex, however, the parts are easily available locally at low cost.

Software development was started immediately when the interface cards became available. A special-purpose driver for the hardware was written. This program, in Terminate-and-Stay-Resident (TSR) form, hooks into one of the interrupts reserved by the PC for the user. The main part of the software, which will control the display, the timing of data acquisition, and communications among the PCs, will be a regular PC program. The main program will communicate with the hardware only through the TSR driver. Development of the TSR driver was

undertaken first because it is the most basic and important part of the software. The TSR driver is now in working condition.

5.2. ENERGY-BASED PROJECTS

Two engineers from the National Power Corporation participated in the TC on Electric System Expansion Planning held in Lahore, Pakistan on 26 April - 4 June 1992. It may be informed that NPC has been using extensively the software learned at the training course. The 1993 Power Development Program of the NPC was solely formulated using the technology and software of Electric Module of ENPEP (the PC version of WASP).

Fifteenth RCA Working Group Meeting
Manila, Philippines, 16-19 March 1993

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 15th RCA Working Group meeting. I also wish to express the appreciation of the Government of Sri Lanka to the Government of the Philippines for hosting this meeting.

Sri Lanka which has been a party to RCA since 1972, notes with satisfaction the success which regional cooperation has achieved in meeting the goals of the RCA to promote and coordinate cooperative research, development, and training projects in nuclear science & technology through the sharing of regional resources, including facilities, equipment and expertise, and the pooling of knowledge and close communication between scientists. Sri Lanka has benefited from RCA activities in a number of areas by way of awareness, development of skilled manpower and application of knowledge to the solution of national problems. I wish to express our gratitude to the IAEA, UNDP, donor countries, national institutes and coordinators in RCA countries and all others who have contributed to the success of the RCA.

It is the declared policy of the Government of Sri Lanka to give highest priority to sustainable development programmes which will bring about improvements in the economic and social conditions, and the quality of life of our people without environmental degradation. The Government has recognized that the proper application of modern science and

technology, including Nuclear Science and Technology is essential for achieving its stated objectives.

INDUSTRIAL APPLICATIONS

Sri Lanka has benefited from the UNDP/IAEA/RCA Industrial Application project through creation of national awareness of the potentialities of NDT, radiation processing, tracer methods and nucleonic control systems and training scientists in these fields.

A national capability for training and for providing services to industry has been developed and a NDT Society has been established. National standards for training and certification of NDT personnel have been established and adopted by Sri Lanka Standards Institute.

Research and development in Sri Lanka on radiation vulcanization of natural rubber latex has shown that the process merits commercial application. Lack of irradiation facilities in Sri Lanka is a drawback for introducing this technology as a commercial basis.

A number of persons have been trained and an awareness has been created through demonstrations on application of nuclear tracers.

Sri Lanka supports and places a high priority on the proposed new project on non-destructive evaluation for quality control and materials development. It also supports the new project on nuclear techniques in processing, modification and characterization of materials.

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 the Government Cancer Institute, National Blood Bank, Colombo General Hospital and the Medical Faculties of the 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 Brachy-therapy system.

Sri Lanka International Eye Bank is in the process of setting up a Tissue Bank. Several persons have been trained and most of the required equipment have been obtained through IAEA. A Co-60 irradiator is needed to make the bank operational. The success the Eye Bank has achieved, having provided 31,000 donor eyes to 61 countries is indicative of the potential of the proposed Tissue Bank.

A Screening programme for Hepatitis-B positive blood using RIA has been introduced with IAEA assistance at the Central Blood Bank in Colombo.

The development of national capability for nuclear instruments maintenance and repair is a high priority programme for Sri Lanka. Under the IAEA project on this subject, national workshops have been held on the quality control and preventive maintenance and services are provided on maintenance and repair. The Atomic Energy Authority is in the process of establishing a centre for maintenance of Nuclear

Instrumentation under an IAEA Technical Cooperation project to provide an efficient service and to develop local manpower.

Sri Lanka supports the new CRP on evaluation of radioactive iodine therapy for hyperthyroidism

FOOD AND AGRICULTURE

Under the RCA project on Food Irradiation, micorbiological studies on irradiated commodities have been carried out, to determine the total mesophilic count, coliform count and fungal count. Studies are being conducted to obtain consumer reaction to irradiated food.

The RCA project on Grain Legume and Rhizobium Symbiosis is an important activity for Sri Lanka because of the need to enhance biological nitrogen fixation by field crops. This will help to reduce dependence on expensive inorganic nitrogen fertilizers.

Sri Lanka supports the new projects on "Banana Improvement in Asia: Integration of Mutation and Related Technologies into Conventional Breeding" and "Establishment of a Regional Rinderpest Sero-monitoring Network in Asia in Support of SAREC".

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. National regulations have been revised and submitted to obtain necessary approvals. A workshop on radiation protection for medical physicists, technicians and nurses, was held in 1991 with IAEA assistance. A training exercise on quality control of X-ray machines for reduction of patient dose was conducted recently

and a workshop is planned for medical scientists in 1993. Several training programmes have been conducted for industrial users.

ENERGY BASED PROJECTS

A number of persons from the Ceylon Electricity Board have been trained on the use of WASP which is being used now by the Generation Planning Branch of the CEB. Sri Lanka supports the continuation of this activity.

Finally Mr. Chairman, we wish to reiterate our appreciation to the Government of Philippines for hosting this meeting, for the excellent arrangements and lavish hospitality.

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COUNTRY STATEMENT - THAILAND
15TH RCA WORKING GROUP MEETING
16 - 19 MARCH 1993, MANILA, THE PHILIPPINES

Mr. Chairman,

First of all, let me congratulate you, on behalf of the Thai delegation, on your unanimous election as the Chairman of the fifteenth RCA Working Group Meeting.

Mr. Chairman, Distinguished Delegates,

I would like to express my deepest gratitude to RCA, UNDP and IAEA for their strong 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 the Philippines 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 their delegates of RCA Member States.

Since the last meeting held in Tokyo, the RCA activities in Thailand has gone through a series of progresses in the following endeavours.

1. UNDP REGIONAL INDUSTRIAL PROJECT

1.1 Tracer Technology

Column scan of about 100 meter high distillation column was conducted at petrochemical plant situation in the Eastern Seaboard Project Area. It was requested by the National Petrochemical Corporation (NPC) which was one of the largest petrochemical plants in this area to investigate the internal structure of the column. The result was satisfactory to the NPC's engineers.

As tracer technology has been proven beneficial to the country development and further expansion of its utilization needs to be promoted, the Government has provided supplementary equipment support. Additional equipment have been and being purchased by our budget to strengthen capability of the existing equipment. With these equipment, the Thai tracer group would be able to undertake and fulfil further activities more effectively.

NEMS on Application of Tracer Technology in Industry will be organized in Thailand in 1993.

1.2 Nucleonic Control System (NCS)

In Phase II, Thailand, through Mae Moh Mine of the Electric Generating Authority of Thailand (EGAT), was selected to serve as the training and demonstration center on the use of NCS in coal processing. The operation has not been without obstacles. Problems related to equipment calibration have been still causing the planned activities postponed. Having fallen the intended goals, however, efforts are being made to eradicate the problems. Assistance from IAEA in this matter is needed.

1.3 Non-Destructive Testing

OAEP has serviced NDT Technology transfer to the private sectors for a period of time. It is planned that from now on the services in this field will be lessen. Emphasizing will be placed on the specific/complicated works and organization of training courses. Three national training courses, RT I, RT II, and UT II were organized by OAEP last year. There were total of 44 engineers and technicians from government agencies, state enterprises and private sectors participating in these courses.

1.4 Radiation Technology

1.4.1 Radiation Vulcanization of Natural Rubber Latex (RVNRL)

In 1992, gamma radiation induced grafting of methylmethacrylate on the natural rubber latex has been studied. The aim of the study is to synthesis the thermoplastic elastomer (TPE) which can be molded with plastic molding machine resulting various types of rubber products. The modified natural rubber latex has also been studied as adhesive material. In addition, the large scale production of both examination and surgical gloves was tried by using 300 kCi gamma irradiator at Thai Irradiation Center (TIC).

1.4.2 Radiation Sterilization

A preliminary study on elimination of microorganism in traditional drug using gamma radiation was conducted.

The minimum pasteurization dose for traditional drug requested by the Government Pharmaceutical Organization was tested.

The effect of irradiation to cosmetic container for cosmetic sterilization requested by Garguar Lab. Co., Ltd. was carried out.

1.4.3 Radiation Curing

After arrival, the ultraviolet curing machine donated by the Australian Government under the Project RAS/86/073 was installed and adjusted to the normal working condition. It is used as a training and research machine for the courses of Printing Ink I and II, Ink and Paper Testing Laboratory I and II. Current utilization is focussed on paper substrate.

The main problems of radiation curing in Thailand are the supply of chemicals, such as monomers, additives, etc. Commercial inks and coatings are available in local market as taxes are quite competitive, but the individual UV chemicals are heavily taxed. Therefore, it is impossible for the company to stock these materials in hand. Such a lack of individual chemicals retards the academic and technological development and technology transfers. However, a plan to transfer the technology through series of training courses is planned for 1994 when the solution to the availability of UV chemical is found.

The use on plywood coating is underway upon request from the Thai Plywood Company.

2. MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

2.1 Radioimmunoassay for Hepatitis B Diagnosis

The evaluation of the quality of the RIA reagent provided by China has been carried out by Chulalongkorn Hospital and the Thai Red Cross Society. In 1992, 6000 serum

samples from blood donors, pregnant and some patients were tested.

There participants from Thailand attended the Training Course on the Preparation of Basic Reagents for RIA of Hepatitis B Markers held in Beijing, China, during 26 April - 7 May 1992.

2.2 Radiation Sterilization of Biological Tissue Grafts

The importance of public health to the development of the country and people hardly needs emphasizing. Thailand, through the Bangkok Biomaterial Center (BBC) has procured bones and tissues from 23 dead donors. The allograft procurement and allograft patients are listed in Table I. The number of allograft patients were 98 from 14 hospitals treated by 42 surgeons as shown in Table II. The allografts were sterilized by gamma irradiation at Thai Irradiation Center (TIC) and Gammatron Co. Ltd.

3. FOOD AND AGRICULTURE

3.1 Food Irradiation Process Control and Acceptance (RPFI III)

A research work under IAEA Research Contract, entitled "Control of Rice and Mungbean Irradiation Processing and Marketing Trial", has been carried out. The research on irradiation processing of rice and mungbean to improve the product loading efficiency and to optimize the product throughput was terminated. Results obtained from both rice and mungbean were acceptable. However, the research on market testing and acceptance of irradiated rice and irradiated mungbean is being undertaken in 1993.

4. RESEARCH REACTOR, BASIC SCIENCE AND ENERGY PLANNING.

Thailand has participated through the research contract no 6704/RB entitled "Program Package for 2-D Burn up Calculation". The objective is to develop the computer program for burn up calculation of TRIGA reactors. At present, development of the package intended to run on microcomputer is in progress.

As part of the co-operation, Thailand is expecting to host the Co-ordinated Research Meeting on Application of Personal Computers to Enhance Operation and Management of Research Reactors in May 1993.

5. RADIATION PROTECTION

5.1 Infrastructure of Strengthening of Radiation Protection.

In order to strengthen radiation protection in all radiation laboratories, OAEP has developed and regularly organized a number of national training courses and Radiation Protection Level I and Level II. Level III is being developed and tested under supervision of IAEA expert. In 1992, both courses of Level I and Level II were satisfactorily held. Participants were scientists, medical staffs and engineers.

5.2 Personnel and Environmental Dosimetry Intercomparison.

After the IAEA/RCA Intercomparison of Personal Dosimeter Workshop held in Japan in 1988, OAEP has set a secondary standard laboratory and has carried on intercomparison among the member countries of the Region. For Thailand, OAEP will serve as the National Center of this task.

6. OTHER ACTIVITIES

The Thai Irradiation Center (TIC) under the auspices of the Office of Atomic Energy for Peace (OAEP) has been in operation since 1989. TIC has been rendering services to government institutes for research, and to the private sectors mostly for commercial purposes. The irradiated food and other products are listed in Table III and Table IV.

COMMENTS

Food Irradiation

The use of radiation for preservation of food is increasing worldwide. Interested countries in this Region should take this opportunity to co-operate on inter-country market trials. At the beginning, a small scale research work is recommended in order to study the effect of transportation and to evaluate the quality of the products. However, all agreeable countries should make agreement on proper control of process in complying with IAEA's recommendations.

Radiation Protection

Regulation and infrastructure related to radiological safety should be concentrated, especially the new technical knowledge and advancement.

Concerning human resource development, workshop, training courses related to radiation protection arranged through RCA should emphasize on train-the-trainers. These will help the trained persons to be able to transfer their knowledge and experience to the others more efficiently.

The environmental and personal dosimetry intercomparison is very important in assuring the quality of radiation protection. Setting this activity as routine work would be very useful for us to put all serving laboratories in this region at the same standard.

NEW PROJECT PROPOSAL

Thailand is interested in participating in the following new project proposals:

1. "Amelioration of Environment Population by of F-1 Sterility for Controlling Caterpillar Pest of Horticultural and Field Crops".

Thailand has researched on F-1 Sterility for Controlling the Diamondback Moth which corresponds to the above proposal.

2. "Banana Improvement in Asia: Integration of Mutation and Related Technologies into Conventional Breeding".

The related research contracts entitled "Induced Mutation for Leaf Spot Disease Resistance in Banana" have been conducted since 1984 till present. IAEA supports, i.e. finance, equipment and expert services, have been continually received. Thailand is pleased to join the subject and will prepare the research proposal accordingly.

3. "Use of the Sterile Insect Technique to Protect Fruits and Vegetables from Destruction by Tropical Fruit Flies"

The use of sterile insect technique for controlling fruit flies has been studied in the North of Thailand at Doi Ang Khang, Chiang Mai Province. This project has been supported by IAEA and has been now entering phase two.

4. "Establishment of a Regional Rinderpest Sero-monitoring Network in Asia in support of the South Asia Rinderpest Eradication Campaign (SAREC)".

Thailand announced the rinderpest-free status in 1959. Since then, the effective measurements to control the disease have been mass vaccination of the susceptible animals in the sensitive areas and disease surveillance. In order to save cost, time and personnel, we are trying to minimize the mass vaccination. More intention will be focused on disease surveillance, especially in the boarder areas. Co-operation among the neighbouring countries as well as through international organizations to exchange information will be relatively increased. Thailand, therefore, absolutely supports the proposal.

CONCLUSION

On the regional basis, RCA co-operation, through various programs and projects, has provided a valuable opportunity to maximize the welfare of the people. Its benefits have been shared by all countries in the region. It is gratifying to note that these benefits has been increasing both absolutely and relatively. Thailand is happy and proud to share with all 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.

Table I The Allograft Procurement and Allograft Patient by Type of Allograft (1992)

Type of Allograft	Allograft Procurement	Allograft Patient
1. Freeze dried		
- Bone	1173	50
- Fascia	20	2
- Dura Mater	35	6
- Amnion	-	-
2. Deep frozen		
- Bone	64	36
- Cartilage	-	2
- Tendon	-	-
- Patellar tendon	3	1
- Hand tendon	-	1
3. Fresh		
- Cornea	4	
TOTAL		98

Table II Hospitals Using Bone Allograft

Ministry/Institute	Number of Hospitals	Number of Surgeons	Number of Patients
Min. of University Affairs	3	21	72
Min. of Public Health	4	8	5
Bangkok Metropolitan	2	5	3
Min. of Defence	1	2	2
Min. of Interior	1	1	2
Private Hospitals	3	5	10
TOTAL	14	42	98

Table III List of Some Irradiated Food Products

Item	Product	Quantity of Irradiated Product (Kg)	
		1991	1992
1	Rice	1115	9692
2	Broken rice	4905	762
3	Maize powder	1378	-
4	Green mungbean	4680	2899
5	Garlic Powder	-	72
6	Pepper	110	-
7	Pepper powder	208	-
8	Dry chili	20	-
9	Chili powder	42	21
10	Onion	-	3425
11	Dried onion leaves	-	58
12	Dried cabbage	-	43
13	Mango	338	502
14	Rambutan	208	132
15	Pineapple	20	-
16	Lychee	-	912
17	Longan	-	840
18	Tamarind pulp	14	-
19	Frozen shrimp	1370	-
20	Frozen fish	66	79
21	Chicken/shrimp meat	12	72
22	Sea food Bar-B-Q	-	24
23	Fermented pork	26957	26811
24	Fermented Fish	5	-

Table IV List of Some Irradiated Non-Food Products

Item	Product	Quantity of Irradiated Product (Kg)	
		1991	1992
1	Herbal medicine	10088	14428
2	Animal feed	1589	1464
3	Fresh tissue	7	-
4	Frozen tissue	2	4
5	Dry bone	12	5
6	Graft bone	62	48
7	Latex glove	2026530 (pairs)	500686 (pairs)
8	Plastic bottle	2053774 (pieces)	2745658 (pieces)
9	Pipet	105400 (pieces)	-
10	Plastic bag	2303	7284
11	Enzyme	59157	97349
12	Dried soil	-	3
13	Sludge	-	2404
14	Silicone	1287	-
15	Cosmetic	447	24263
16	Plastic cap	-	50000
17	Plastic container	-	471
18	Dropper	72500	79500
19	Fruit fly pupae	1728000 (pupae)	-
20	Gypsum	-	326
21	Glass vial	-	1498100 (pieces)
22	Gem	706	1413

COUNTRY STATEMENT OF VIET NAM

The 15th RCA Working Group Meeting
Manila, Philippines, 16-19 March, 1993

Viet Nam is happy to attend the 15th RCA Working Group Meeting and would like to express our gratitude for hosting the Meeting and the warm hospitality extended to all RCA delegates of the Philippine Government.

As a RCA Member State, Viet Nam is very pleased that the year 1992 has gone with great efforts of RCA countries in bridging the period of accomplishment of the UNDP Industrial project RAS/86/073 and preparation for launching a new one. Since last year, the RCA formally entered into the fifth year term. All that makes the Meeting especially important and create working momentum within RCA States.

Viet Nam was involved in, and tried our best to contribute to all RCA activities. Seeing Techno-economic benefits achieved in implementing RCA programmes, Viet Nam would like to express our deep thanks to all RCA members, especially to the Governments of Australia and Japan for effective supports in co-ordinating with the Agency to make the RCA reserve its own regional features. This can be seen from the shares of the Agency and Extra-budgetary in 1992, which count for 39.8% and 42.8% of the total RCA budget respectively.

At this meeting we would say that in Viet Nam last year, all RCA activities have made up our progress in bringing applications of Nuclear Techniques into various economic sectors of the country, which is included in the following:

I. INDUSTRIAL APPLICATIONS.

Viet Nam highly appreciates the Agency's support and the contribution of Australia and Japan to 1992 bridging activities in Industrial Applications, which indeed, made the transitional period smooth. As a project beneficiary, the following activities have been done in the scope of the project:

1. Tracer Technology

All the scientists getting training and expertise provided under the sub-project and TC related projects have contributed significant shares to the in-country UNDP projects on sediment study. Surveys on sediment movement at Haiphong port, using radiotracers have well incorporated with an on-going TC project VIE/8/007. Studies on damp leakage in Tri An and on underground water movement in Vinh Long province have used I-131 and P-32 as tracers. Under a state-funded project, at present a laboratory for sediment studies in Dalat is able to produce radio-tracers and containers for tracer transportation. There are more than 20 qualified scientists working in this field in Viet Nam.

2. Radiation Technology

A number of radiation tests have been carried out in our unique irradiation facility in the last year for such purposes as: food preservation, material curing, medical product sterilization. This has considerably contributed to the implementation of the National Programme on Nuclear Science and Technology. Namely, a follow-up move for sterilizing fertilizing carrier for nitrogen fixation has brought practical significance to agricultural sector.

In 1992, with the IAEA's support and Indonesian contribution, three Vietnamese scientists (one was at our expense) were sent to Indonesia for one month with 1.8 tons of natural rubber latex for irradiation trial. The irradiated latex showed appropriate quality for desired products.

3. Nuclear Control System

NCS groups in Ho Chi Minh City and Hanoi have successfully implemented Techno-economic contracts with local cement and paper mills in maintaining, repairing, renovating and installing NCSs. Unfortunately, due to the project financial constrain, in the last year there was no chance to send specialists from industry for training, which has been very much in need.

Viet Nam sees the schedule of new UNDP/RCA project RAS/92/073 reliable, beneficial to Technology Transfer and for stronger coherence of co-operation within RCA countries. We have no comment on the project budget.

II. NUCLEAR MEDICINE

Incorporating with the progress achieved in health care services, nuclear medicine in Viet Nam has been improved in diagnosis and in therapy as well. With the assistance of the IAEA and a National Programme, Gamma Cameras and other radio-therapy facilities have been provided and purchased to strengthen health care services in the country. This raises a question of training and radiation protection in the medical sector. Taking part in the regional activities in the nuclear medicine, Viet Nam got benefits in getting training for physicians from hospitals. We hope that in the coming period more specialists from the sector will get training under the new project RAS/6/022 and other related projects.

Under project RAS/6/018 devices and reagents for the diagnosis of hepatitis B infection by RIA have been provided. With this assistance, the methodology has been introduced and established in hospitals throughout the country. Though the kits supplied network is not so good that kits received mostly have too short expiration to distribute to hospitals, even some were out-dated before reaching users, they have been used for:

- + Classifying blood donors from those infected with hepatitis B viruses
- + Detection Hepatitis B virus in patients suffering liver diseases
- + Surveys on Hepatitis B epidemiology

Concerning the radiation techniques for sterilizing tissue grafts Viet Nam would say that we have gained significant benefits from taking part in the regional project RAS/7/003. A State-funded project has supported the dissemination of this most reliable technique for tissue preservation. At the end of 1992, in Viet Nam, 4260 tissue units were irradiated for clinical use and study work, from which 108 patients were treated with bone implantation at the complication rate of 6%; irradiated biomembranes were used for 260 patients with burn wounds. Apart from that, a Research Contract on Tissue preservation and Banking with the IAEA has been carried out. A Regional Course Train-the-Trainers on Principles and Practices of Tissue Banking will be hosted by Viet Nam in Ho Chi Minh City in the fourth quarter of 1993.

The well co-ordinated implementation of projects RAS/4/008 and RAS/4/012 has brought progress in establishing communication network for:

- + training technical personnel
- + integrating R&D activities of nuclear instrument maintenance and repair.

With the effectively assistance of the Agency Viet Nam successfully hosted a Regional Workshop on Evaluation of Modern Spectroscopy Amplifiers, which is a contribution of Viet Nam to the RCA.

Regarding new project proposals in Nuclear Medicine, Viet Nam not only supports the project proposal of CRP on Evaluation of Radioactive Iodine Therapy for Hyperthyroidism but also calls on RCA States and the Agency to get it approved. In the trend to improve health services in the country, Viet Nam highly appreciates the generous contribution of the Government of Australia to the new project RAS/6/022 for promoting Nuclear Medicine in the Region.

III. RADIATION PROTECTION

In 1992 Viet Nam has put great efforts on the establishment of Radiation Protection Infrastructures of the country. A legal network for ensuring radiation protection in all sectors of the national economy, involving in nuclear techniques and materials, is underway to be ameliorated with competent power. National training courses have been organized with the assistance of the local government, the IAEA project VIE/9/004, and of course, of the encouragement of project RAS/9/006.

In the light of regional project RAS/9/006, technically, Viet Nam has participated in the regional programmes on Intercomparison of Personal Dosimeters, and Compilation of Anatomical. Physical and Metabolic Reference for Asian Man, which have been sponsored by Australia and Japan respectively.

Viet Nam is willing to participate in the new Australian funded project on Industrial Radiation Protection and hope the footnote a/ project RAS/9/006 will officially get funded.

IV. FOOD AND AGRICULTURE

Under the project RAS/5/020 a pilot-scale irradiation practice has been carried out for onions. The irradiated onions were sold in the market. It appears that irradiated food would be accepted by Hanoi settlers. A lab-scale trial on inhibiting bananas from getting ripe was carried out, whose results permitted to plan further tests on pilot scale.

Moreover, VINATOM keeps close co-operation with the ministry of Agriculture and Food Industry in studying and bringing nuclear techniques into practice. With the success gained from implementing a Research Contract signed with the Agency on Application of EIA and related methods for diagnosis for seroepidemiology surveys of parasitic infections and preparation of vaccine against these diseases Viet Nam would like to go further on this area by taking part in the project on Establishment of a regional rinderpest seromonitoring network in Asia in support of the South Asia Rinderpest Eradication Campaign (SAREC) if it gets approved. Viet Nam renews its support for the new project proposals on:

- Amelioration on Environmental Pollution by of F-1 Sterility for Controlling Caterpillar Pest of Horticulture and Field Crops.
- Use of Sterile Insect Techniques to Protect Fruits and Vegetables from Destruction by Tropical Fruit Flies.
- We do not think that the current trend for zero support in 1995 to Agriculture is desirable. In our region the percentage of population relying on Agriculture is not less than 50%, moreover, the profit gained from agricultural products is considerable. Therefore, we would like to draw RCA countries attention on the above-mentioned fact.

V. RESEARCH REACTOR AND ENERGY BASED PROJECTS

In 1992, Dalat Nuclear Research Reactor was effectively exploited with 100 hrs incessantly at work after every 3 weeks. The Dalat NRI has been able to meet the need for radioisotopes of hospitals in the country (TC-99m, P-32, I-131). Apart from producing radioisotopes and carrying out neutron activation analysis, which are its routine work, in the last year, the Dalat NRI introduced two horizontal tubes serving prompt gamma neutron activation analysis. A neutron filter is put on the radial beam tube to generate quasimonochromatic neutron, which is used for neutron data study.

Viet Nam's experience in radioisotope production has been exchanged within RCA countries.

Shortly, we would say that with the only research reactor Viet Nam has improved its utilization and operational safety. Presently, with the great support of National programme, the Vietnamese scientists, who have got training from IAEA and RCA have been carrying out the reactor refurbishment by themselves. Viet Nam also has got benefits from implementing project RAS/O/013, particularly in manpower development. We have prepared the first step for introducing nuclear power into Viet Nam. There have been done such works as updating data for WASP-III programme, getting used to MAED. VALORAGUA. MICROCOSM. Viet Nam renews its support to the new project proposal on accelerator based technology.

VI. CONCLUSION

Viet Nam would like to express its high appreciation of the great efforts put by the Agency, all RCA Member States in the last year to get the RCA extension and UNDP/RCA project approved, to which the Government of Mongolia - a new member of the RCA has its first contribution. In this aspect Japan and Australia have evidently proved the role of the traditional donors in the region. Accordingly, we do continue and enhance its involvement in all RCA activities, which we believe will bring benefits to Nuclear society of our country in this 5 year term.

RCA ACTION PLAN 1993-94

Field	Project	Technical Officer	Project No.
Medical and Biological	Quantitative Evaluation of Nuclear Medical Procedures for Diagnosis of Liver Diseases (Phase II)	G. Nair	E1.30.06
	Improvement of Cancer Therapy in Asian Countries (Phase II)	F. Durosinmi-Etti	E3.30.08
	Use of Computers in Tc-99m Imaging	A. Cuaron	RAS/6/016
	Radiation Sterilization of Tissue Grafts	R. Mukherjee	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	T. Yamasaki	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	I. Lewkovicz	
	- Non-Destructive Testing	B. Zatolokin	
	- Radiation Technology	V. Markovic	
	- Nucleonic Control Systems	R. Mani	
- Nuclear Analytical Techniques	+		

RCA ACTION PLAN 1993-94

Field	Project	Technical Officer	Project No.
Agriculture	Food Irradiation Process Control and Acceptance	P. Loaharanu	RAS/89/044 (UNDP) RAS/5/020
	Increasing the Yield and Nitrogen Fixation Capabilities of Common Grain Legumes	S. Danso	RAS/89/045 (UNDP) RAS/5/021
Radiation Protection	Strengthening of Radiation Protection	P. Strohal	RAS/9/006
	Activities: - CRP: Reference Asian Man	R. Griffith	J3.20.01
General	Research Reactor Utilization Including Basic Science Using Research Reactors	K. Akhtar	RAS/4/011 F1.20.09
	Energy and Nuclear Power Planning	P. Molina	RAS/0/013
	Nuclear Information System	W.M. Toaka	RAS/0/019*
	Development of TCDC in Asia and the Pacific	J.F. Easey (Project Officer)	RAS/0/015

+ Technical Officer to be appointed

* New Project for 1993-94, subject to Board approval

RCA BUDGET AND BUDGET ESTIMATES FOR 1993 - 94*

Project No.	Title	Fund Source	BUDGET US \$K	
			1993	1994
RAS/0/013	Energy and Nuclear Power Planning	TC ADB	10.35 -	80.80 100.00
RAS/0/015	Development of TCDC in Asia and the Pacific	TC IND ROK CPR	41.40 50.00 25.00 50.00	94.80 50.00 25.00 50.00
RAS/0/019**	Nuclear Information System	TC	-	66.60
RAS/4/008 CRP: E1.10.06 E1.10.07	Nuclear Instrument Maintenance	TC	165.75	168.00
RAS/4/011 CRP: F1.20.09	Research Reactor Utilization	TC	80.70	80.80
RAS/5/020 (RAS/89/044)	Food Irradiation Process Control and Acceptance	UNDP	172.50	-
RAS/5/021 (RAS/89/045)	Improvement of Grain-Legume Rhizobium Symbiosis to fix Atmospheric Nitrogen	UNDP	203.60	74.50
RAS/6/016	Use of Computers in Technetium - 99m Imaging	a/	-	132.00
RAS/6/018	Radioimmunoassay for Hepatitis B Diagnosis	TC	237.45	204.80
RAS/6/022	Strengthening of Nuclear Medicine in RCA Member States	AUL	114.00	110.00
RAS/7/003 CRP: E3.10.04	Radiation Sterilization of Tissue Grafts	TC	151.40	153.20
RAS/8/068 RAS/8/070 RAS/8/069 RAS/8/071 (RAS/92/073)	UNDP "Environmentally Sound Technologies"	TC JPN AUL UNDP	103.15 304.20 147.50 506.96	150.40 320.00 155.00 797.30

Project No.	Title	Fund Source	BUDGET US \$K	
			1993	1994
RAS/9/006 CRP: J3.20.01	Strengthening of Radiation Protection Infrastructure	TC JPN AUL	61.05 100.00 110.00	92.40 200.00 102.50
CRP: E1.30.06	Imaging Procedures for Diagnosis of Liver Diseases (Phase II)	JPN	48.00	-
CRP: E3.30.08	Improvement of Cancer Therapy (Phase II)	JPN	58.90	-
Total			2741.91	3208.10

* Note these figures are estimates only. In particular they do not imply commitment by donor countries.

** New Project for 1993-94.